Digital Compilation of Bedrock Geology and Till Geochemistry, Glenlyon (105L) and Eastern Carmacks (115I) Map Areas, Yukon Territory

by

M. Colpron[1], J. D. Bond[1], P. S. Lipovsky[1], K. Gladwin[2]

S. P. Gordey[3], D. C. Murphy[1], J. L. Nelson[4], A. Plouffe[3], C. F. Roots[3] and J. G. Abbott[1]

2003

Glenlyon component of the
Integrated geoscience mapping for Yukon:
NATMAP enhancement
(Targeted Geoscience Initiative)

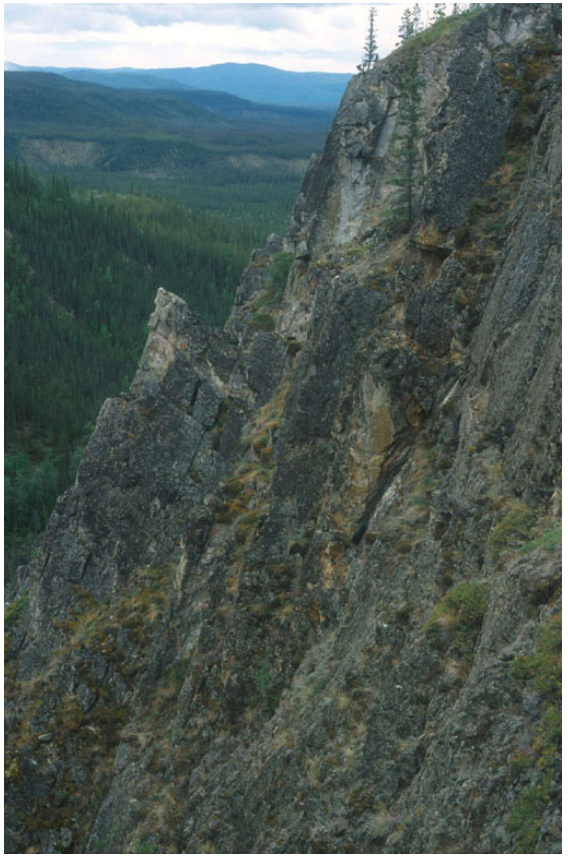
EGSD Open File 2003-7(D)

GSC Open File 1561

[1] Yukon Geology Program
[2] University of Victoria
[3] Geological Survey of Canada
[4] British Columbia Geological Survey

Table of Contents

Table of Contents 1
1.0 Introduction to CD 2
1.1 Software and System Requirements 3
1.2 Getting Started 4
1.3 Directory Structure 5
1.4 GIS Spatial Data Formats 6
2.0 Geological Summary 8
2.1 Bedrock Mapping 10
2.2 Till Geochemistry (modified from Bond and Plouffe, 2003) 13
2.3 Crew 15
3.0 Interactive Maps 17
3.1 ArcExplorer™ 2.0 20
3.2 ArcView™ 3.x Projects 25
3.3 ArcMap™ 8.x Projects 27
3.4 MapInfo Workspaces 28
3.5 AutoCAD™ Map 29
4.0 Theme Descriptions 30
4.01 Bedrock Field Database Themes 31
4.02 Bedrock Geology 32
4.03 Yukon MINFILE 34
4.04 Isotopic Age Dates 35
4.05 Fossils 36
4.06 Surficial Geology Field Data 37
4.07 Surficial Geology Map Units 38
4.08 Till Geochemistry 39
4.09 Regional Geochemical Survey (RGS): 41
4.10 Topographic Features 42
4.11 Other Base Map Layers 44
4.12 Geophysical Images 46
4.13 LandSat Images 48
5.0 Published Maps and Reports 49
5.1 YEG Papers 50
5.2 YGP Bedrock Geology Maps 51
5.3 GSC Surficial Geology Maps 51
5.4 Unpublished Figures 52
6.0 Field Databases 53
6.1 Bedrock Geology 54
6.1.1 GeoFIELD 56
6.2 Surficial Geology 57
7.0 Photo Gallery 59
8.0 Recommended Citation 60
9.0 Other Geoscience Information and Sales 61
10.0 References 62



1.0 Introduction to CD

This CD-ROM contains digital data files that were assembled or created from the 2002 Glenlyon component of the Targeted Geoscience Initiative (TGI) project. All data is provided in formats easily explored using widely available free softwares, which are distributed on this CD.

Features of the CD include:

- GIS spatial data of bedrock and surficial geology, generalized background topography, and georeferenced geophysical and satellite raster images
- Interactive map projects to allow viewing and querying of the spatial data using a variety of common GIS software (ArcExplorer 2.0, ArcView 3.x, ArcMap 8.x, and MapInfo)
- Databases of field observations (bedrock and surficial geology)
- Publications relevant to the study area, including open file maps, and a collection of reports from the *Yukon Exploration and Geology* (YEG) series
- A photo gallery to illustrate representative rock units and surficial geology features
- Free softwares (Adobe Acrobat Reader 5 and ESRI ArcExplorer 2) for viewing publications and interactive maps

Navigation to the features described above is through a user-friendly interface which launches upon loading of the CD. All features can also be accessed through Microsoft Explorer.

1.1 Software and System Requirements

The GIS data provided on this CD is in shapefile format which can be easily viewed using most commercial GIS softwares (ArcView 3.x, ArcMap 8.x, Mapinfo, or AutoCAD Map). This data can also be viewed with ESRI's ArcExplorer free GIS software (ArcExplorer 2 is included on this CD). Installation of ArcExplorer (or ownership of a licensed version of one of the more advanced GIS products listed above) is required to view the interactive maps on this CD.

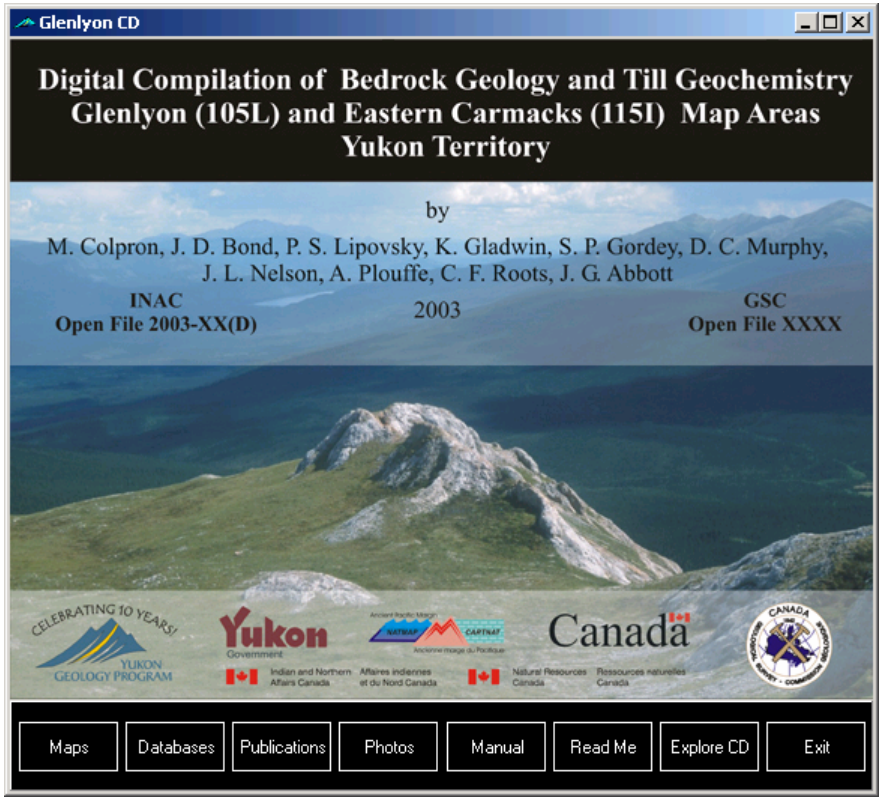
Field databases are provided in Microsoft Access and Excel formats, as well as dBase (*.dbf) files. These data can be viewed with licensed copies of Microsoft Access and Excel or through the interactive maps.

The documentation, and published maps and reports are provided as PDF files. Installation of the free Adobe Acrobat Reader (or ownership of a licensed version) is required to view these files (Adobe Acrobat Reader 5 freeware is included on this CD).

This CD runs on Windows 95 platforms and higher, and has been tested on Windows 98, 2000, NT and XP. Performance times for use of the interactive maps will depend on individual hardware componentry and memory availability. It is therefore recommended that users copy all data onto a local hard drive for greater speed in accessing and displaying the spatial data.

1.2 Getting Started

The CD-ROM contains an “AutoRun” routine which will launch the interface or **Home panel** (shown below). If AutoRun is disabled on your computer or the home panel does not appear automatically, the interface can be loaded by running the **GlenlyonCD.exe** file manually using Windows Explorer.

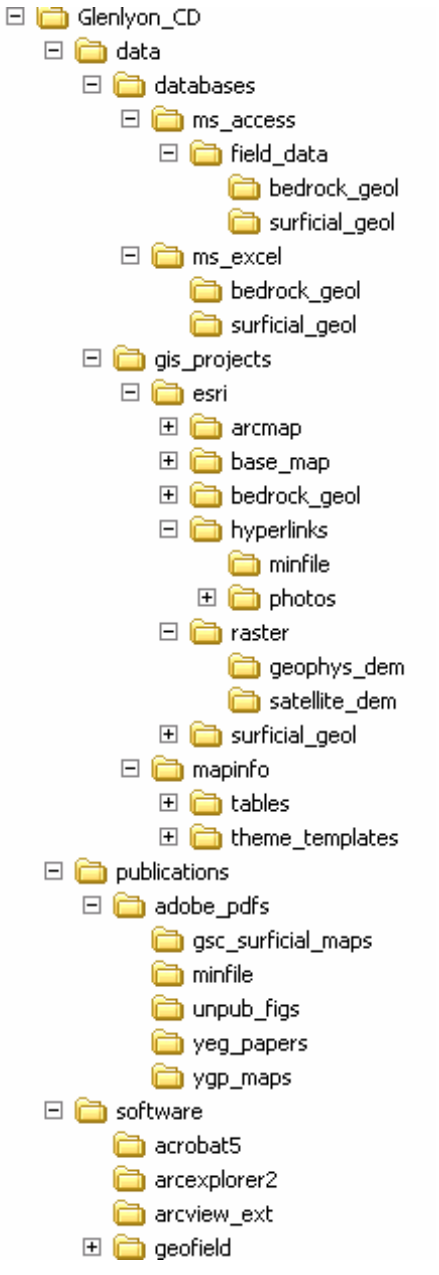


The **Home panel** provides navigational links to the various features of this CD-ROM. The buttons on this panel allow the user to access other panels from which you can view ***Interactive Maps***, field observation ***Databases***, map and report (***Publications***), a collection of ***Photos*** of representative bedrock and surficial stations and samples from the area, and a help guide (this document) for the use of this CD (***Manual***). Additional buttons provide access to a ***Read Me*** file and the CD directory structure using Windows Explorer (***Explore CD***).

Free Installation files for required data viewing software can be accessed by clicking the Interactive Maps button (for ArcExplorer 2.0) or the Publications button (for Adobe Acrobat Reader 5).

1.3 Directory Structure

The data on this CD are organized into three main folders, as shown on the left.



All GIS spatial data, databases, raster images and photos are in the Data folder.

All published maps and reports in Adobe Acrobat Reader format are in the Publications folder.

The Software folder contains free ArcExplorer installation files for viewing interactive maps, and Adobe Acrobat Reader installation files for viewing published maps and reports. A free hyperlinking extension for ArcView 3.x to enable opening of photos and reports interactively within ArcView is also included. Finally, a copy of GeoFIELD, the Yukon Geology Program's Access field database is also included. GeoFIELD can be used to manage and store field data, as well as plot stations and structural symbols interactively in AutoCAD Map.

NOTE: Through this manual, all references to the **root directory** refer to the **Glenlyon CD** folder. All path names written in this document are written in italics and use two dots to represent (..) the root directory. For example, if a file name is given as "*..data\gis_projects\esri\bedrock.mxd*", it is located at "*Glenlyon_CD\data\gis_projects\esri\bedrock.mxd*".

1.4 GIS Spatial Data Formats

The GIS spatial data formats on this CD include ESRI shapefiles, MapInfo tables, raster images, and Access databases.

The **projection** of all spatial data contained on this CD is the Universal Transverse Mercator (UTM) coordinate system, NAD 83 datum, Zone 8.

1.4.1 VECTOR DATA:

Shapefiles can be used in all of ESRI's GIS software, and can be easily imported into other GIS formats such as MapInfo and AutoCAD. One shapefile can be comprised of up to 9 different files of the same name, but with different extensions (*.shp, *.dbf, *.sbn, *.sbx, *.shx, *.xml, *.avl, *.lyr, *.prj). When moving or copying a shapefile, all of these files must be moved or copied together. For ArcView 3.x users, accompanying legend files (*.avl) are included, and for ArcMap users layer (*.lyr) and projection (*.prj) files are also included so that symbology can be reproduced in custom map projects built from scratch.

Mapinfo table files are also included. These were created by importing the ESRI shapefiles into table format using MapInfo's Universal Translator. Like shapefiles, a MapInfo table is comprised of up to 5 separate files of the same name, but with different extensions (*.tab, *.map, *.ind, *.id, *.dat). When moving or copying a table, all of these files must be moved or copied together.

… 1.4 GIS Spatial Data Formats

1.4.2 RASTER DATA:

Geophysical and satellite raster data is provided in *.jpg image format, with associated world files (*.jgw) for proper georeferencing. Pyramid files (*.rrd) and auxiliary files (*.aux) are included for faster regeneration within ArcMap 8.x. The JPEG extension must be activated when viewing the raster data within ArcView 3.x. ArcMap and ArcExplorer will read the rasters directly. Table files (*.tab) are also included for referencing the rasters in MapInfo.

1.4.3 ACCESS DATABASES:

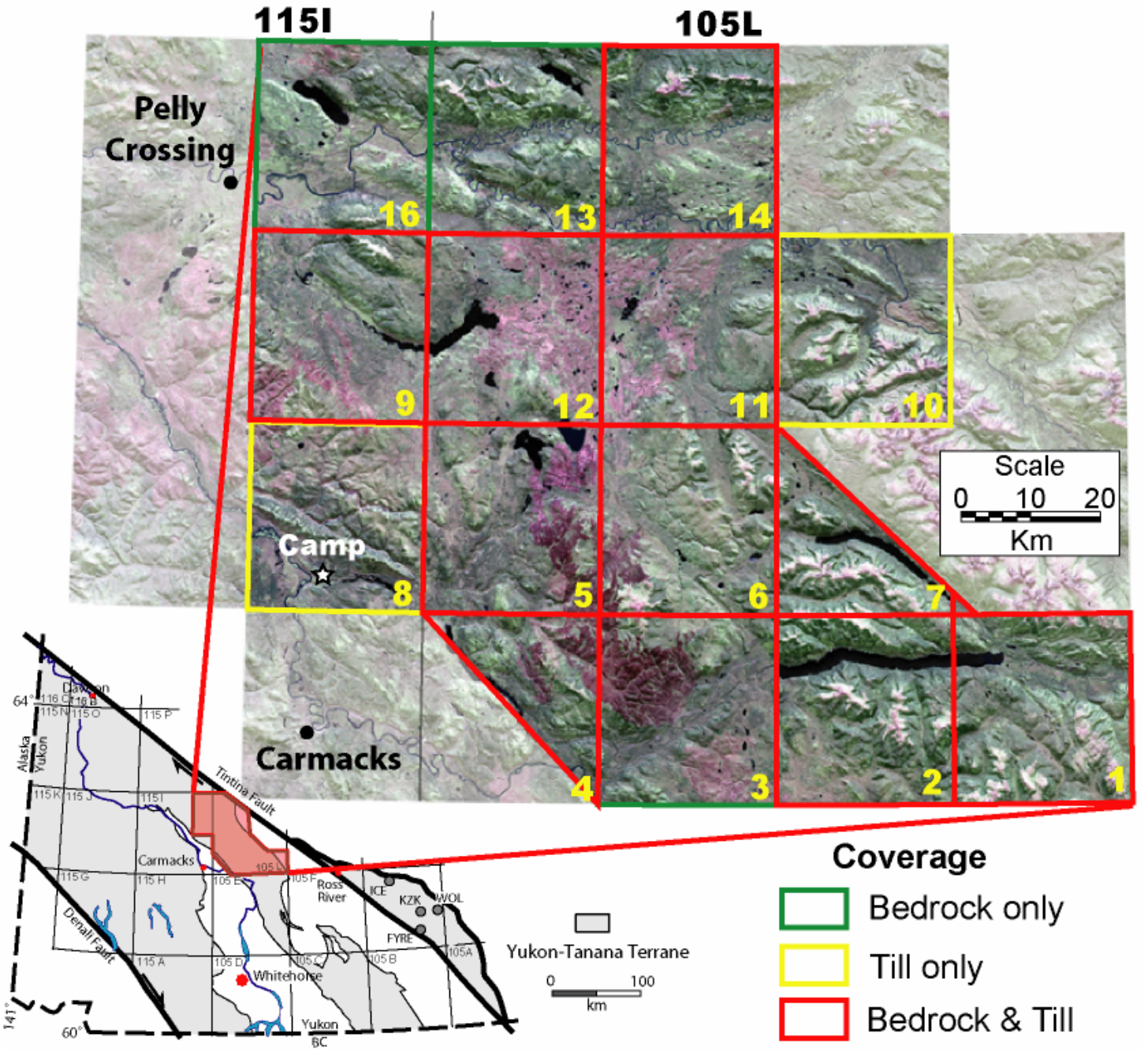
ArcView 3.x, ArcMap 8.x and MapInfo can read data from an Access database. In ArcView 3.x, use SQL connect to access the database. In ArcMap 8.x, use database connections. If spatial data is present as coordinates in a table or query, an “event theme” can then be created to plot point data from the databases. If no spatial data is present in the table, non-spatial attribute data can be joined or related to existing shapefiles.

2.0 Geological Summary

This CD-ROM contains the results of an Accelerated Bedrock Mapping and Till Geochemistry program of parts of Glenlyon (105L/1-7, 11-14) and northeast Carmacks (115I/9,16) map areas. The field program was conducted between June 15 and July 19, 2002 under the auspices of the Yukon Targeted Geoscience Initiative (TGI - Integrated geoscience mapping for Yukon: NATMAP enhancement), a joint program that combined geologists and funding from the Geological Survey of Canada and the Yukon Geology Program. It was designed as an enhancement to the Ancient Pacific Margin NATMAP project. This program followed a previous Accelerated Bedrock Mapping and Till Geochemistry program in the Finlayson Lake map area (Bond et al., 2002).

The Glenlyon project aimed at extending the bedrock mapping of Yukon-Tanana Terrane from areas of detailed mapping in southern and northwestern Glenlyon (105L1,2,7,13) to intervening poorly exposed grounds. The till geochemistry coverages was conducted to supplement the low density of stream geochemistry samples in the area

The centre of the area is underlain by prospective rocks of Yukon-Tanana terrane (host of the Finlayson Lake district massive sulphide deposits). Yukon-Tanana terrane is flanked to the northeast by rocks of Ancestral North America (Cassiar terrane) and to southwest by the enimagtic Semenof block.


115I
105L
Pelly Crossing
16
13
14
9
12
11
10
Camp
8
5
6
7
Carmacks
4
3
2
1
Scale
0 10 20
Km
Tintina Fault
Denali Fault
Dawson
Alaska
Yukon
Carmacks
Ross River
ICE
KZK
WOL
FYRE
Whitehorse
Yukon
64°
60°
141°
Yukon-Tanana Terrane
0 100
km
Coverage
Bedrock only
Till only
Bedrock & Till

2.1 Bedrock Mapping

In 2002, Yukon Geology Program joined once again with the Geological Survey of Canada to fund and implement the last year of the Yukon Targeted Geoscience Initiative (TGI). The 2002 program focussed on completing a new bedrock geological map of parts of Glenlyon (105L) and eastern Carmacks (115I) map areas (Colpron et al., 2002). Under the auspices of the TGI, personnel from both organizations worked for five weeks with a contract helicopter out of a base camp near Tatchun Lake. The intent of the TGI was to determine the regional extent of Carboniferous volcanic rocks of Yukon-Tanana Terrane, which have potential for volcanic-hosted massive sulphide deposits, and their local basement. The Glenlyon area lies along regional trend to the south of the Finlayson Lake district when ~425 km of dextral displacement is restored along Tintina Fault. The TGI also aimed at determining the nature of the contact between Yukon-Tanana and Cassiar terranes, and the composition of volcanic rocks at the northern end of the Semenof block (Tempelman-Kluit, 1984) and their relationship to Yukon-Tanana Terrane.

This CD-ROM contains the digital data collected in the field and generated during the production of the new bedrock map. Description of the field relationships can be found in Colpron et al. (2003).

Previous studies

Geological observations from the area were first reported by Dawson (1888) who travelled along the Pelly River in 1887. In 1902, McConnell (1903) explored the Macmillan River. In 1928, Cockfield (1929) made a geological reconnaissance of the Little Salmon and Magundy valleys. The Pelly River, upstream from the mouth of the Macmillan River, was revisited in 1935 by Johnston (1936). Between 1932 and 1949, H.S. Bostock was engaged in mapping the areas surrounding the Glenlyon map area – including Carmacks (115I) to the west (Bostock, 1936), Laberge (105E) to the south (Bostock and Lees, 1938), Mayo to the north (Bostock, 1947), and McQuesten (Bostock, 1964).

Reconnaissance mapping of the Glenlyon map area (105L) was not conducted until the early 1950s (Campbell, 1967). Carmacks and Laberge map areas were the object of a second generation of

reconnaissance mapping by Tempelman-Kluit (1984). In Glenlyon, only limited detailed structural studies (Oliver, 1996; Oliver and Mortensen, 1998) were conducted since the area was first mapped by Campbell (1967).

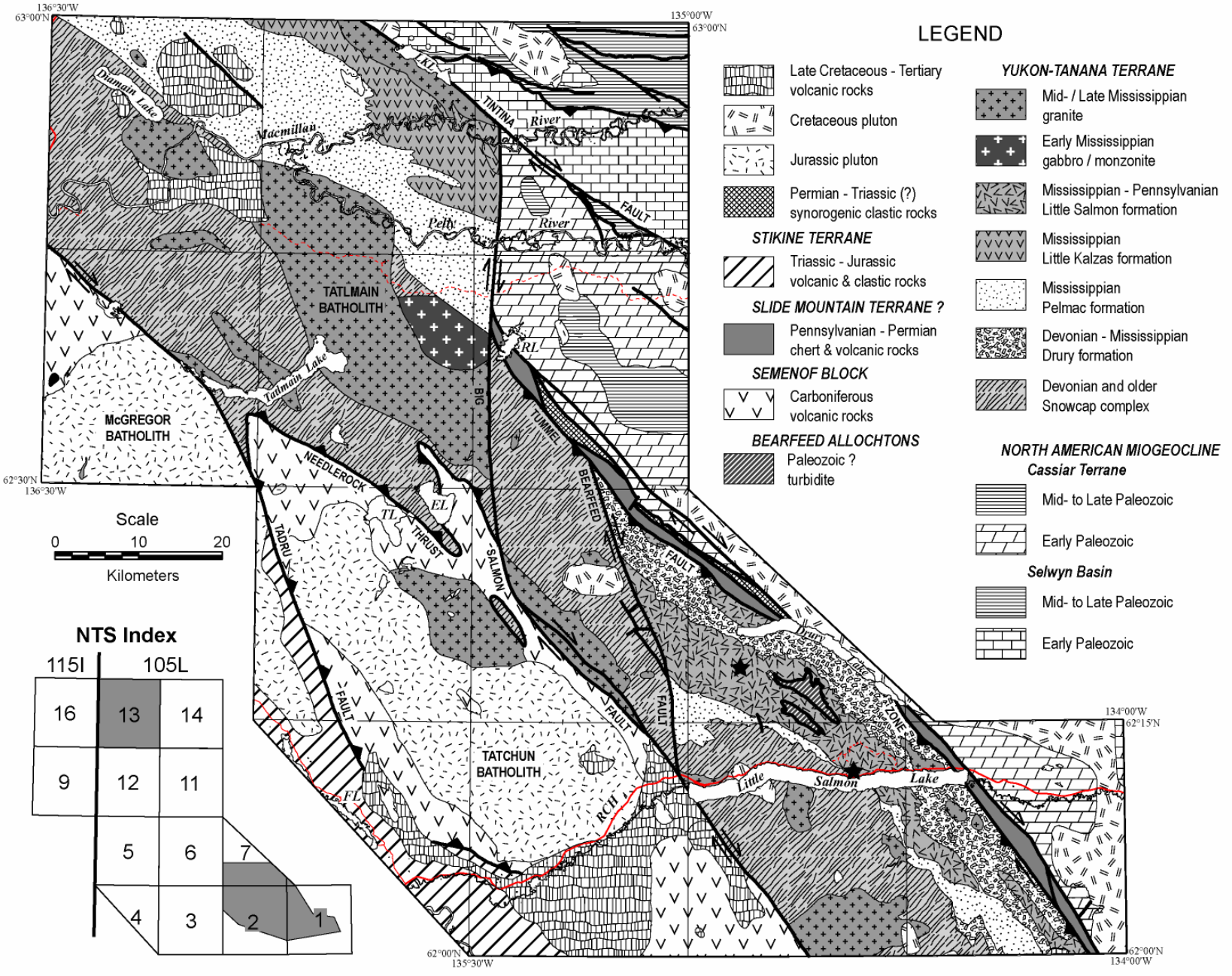
Current study

Systematic detailed bedrock mapping of the Glenlyon map area (105L) was initiated in 1998. Between 1998 and 2001, 1:50 000-scale mapping focused on areas of better exposures in northwest Glenlyon map area (105L/13; Colpron, 1998; 1999a) and near Little Salmon Lake, to the south (105L/1,2,7; Colpron, 2000; Colpron and Reinecke, 2000; Gladwin et al., 2002a). This detailed mapping has defined the stratigraphic framework of Yukon-Tanana Terrane in the area. In particular, it has identified successions of Carboniferous arc volcanic rocks, associated plutonic suites of Mississippian age, and their potential basement complex (Colpron, 2001). This work also uncovered indications that hydrothermal systems capable of producing volcanogenic massive sulphide deposits operated during volcanism, including a small massive sulphide occurrence (Yukon MINFILE 105L 062; Colpron, 1999b) and occurrence of Mn chert exhalite in the Little Salmon formation. This detailed work lay the foundation for regional, helicopter-supported bedrock mapping in poorly exposed areas of Glenlyon and northeastern Carmacks map area during the 2002 summer.

Bedrock geology *(Colpron et al., 2003)*

The study area extends from displaced North American miogeoclinal strata of Cassiar Terrane in the northeast to the accreted arc volcanic and clastic rocks of Stikine Terrane in the southwest (Colpron et al., 2002). The core of the area is underlain by a northwest-trending belt of metasedimentary, metavolcanic and (meta)plutonic rocks of the Yukon-Tanana Terrane. To the southwest, Yukon-Tanana Terrane is juxtaposed with the Semenof block – a belt of mafic metavolcanic rocks of uncertain terrane affinity (Tempelman-Kluit, 1984) – along the Needlerock and Big Salmon faults. To the northeast, the Tummel fault zone delineates the contact between Yukon-Tanana and Cassiar terranes. The narrow belt of chert, argillite and greenstone which occurs within the Tummel fault zone probably correlates with the Slide Mountain Terrane. The area is intruded by Early Jurassic and Cretaceous plutons and is dissected by a series of late faults.

Bedrock Geology Map parts of Glenlyon (105L) and Eastern Carmacks (115I)



Grey shaded areas show areas of 1:50 000-scale mapping

2.2 Till Geochemistry *(modified from Bond and Plouffe, 2003)*

In continuing the program of bedrock mapping and till geochemistry across prospective tracks of Yukon-Tanana Terrane (YTT) the TGI focus shifted northwest towards the Glenlyon map area. Last year, TGI efforts were focused in the Finlayson Lake region where a large tract of YTT remained poorly mapped amidst high mineral potential. The geology of the Glenlyon map area was suspected to mirror the Finlayson Lake district following restoration of 425 km displacement along the Tintina Fault. While the geological relationship seemed favourable in the Glenlyon region, vast areas of poorly understood geology are blanketed by glacial deposits. Furthermore, drainage is poorly developed in the plateau region of the Glenlyon map area which is reflected by a low sample density of regional stream sediment geochemical data. Similar to the Finlayson project, till was favoured as a sampling medium for the following reasons: 1) it occurs abundantly on plateaus and hills in areas of poor bedrock exposure; and 2) it is considered a first-order derivative of bedrock (Shilts, 1976, 1993).

Previous studies

Quaternary stratigraphic investigations and surficial mapping were completed by Ward (1989; 1993), Ward and Jackson (1992; 2000) and Jackson (2000) for the Glenlyon and eastern Carmacks map areas. Surficial geological mapping was completed at 1:100,000 scale for both areas and provided the background for this work. Related studies to the north of Glenlyon and Carmacks map areas include surficial mapping by Hughes (1982) in Mayo (105M) and placer gold deposit studies in the Mayo mining district (LeBarge et al., 2002). Surficial mapping and

Quaternary stratigraphy investigations were undertaken in McQuesten (115P) to the northwest (Bond, 1997). More recently, a drift prospecting and surficial mapping study was completed to the east in the Anvil district (Bond, 2001).

Sampling and analytical methodology

A total of 3 samples were collected at each till sample station. This included a 2-kg and a 1-kg bulk till sample for geochemical analysis of the silt plus clay-size fraction (-230 mesh or <0.063 mm) and the clay-size fraction (<0.002 mm), respectively. The third sample consisted of a lithological record comprising 50 pebbles. Lodgement till and colluviated lodgement till was the primary sample medium. Each till pit was hand-dug to a depth averaging 50 cm in order to collect till from the C-horizon (unweathered parent material. Where possible, till was sampled from natural exposures during stratigraphic investigations. This is beneficial when thick till deposits are encountered and enables assessment of the vertical variability of the till geochemistry.

The till samples were sent to Acme Analytical Laboratories in Vancouver, British Columbia for: 1) separation of the silt and clay-size fraction (2-kg sample) and 2) geochemical analysis. Samples were oven dried at 40 celcius and dry-sieved to separate the silt and clay-size fractions (<0.062 mm or -230 mesh). Samples of 30 g were analysed for 39 elements by inductively coupled plasma mass spectrometry (ICP-MS) after an aqua regia digestion. The digestion acts as a near total digestion on sulphide minerals and a partial leach on silicate minerals. Results of the geochemical analyses of the clay-size fraction were not available at the time this was prepared, but will be released in a later publication together with the 2001 clay-size results (see Bond and Plouffe, 2002).

2.3 Crew

Bedrock Mapping:

Geologists:

Maurice Colpron	***Yukon Geology Program*** *(Yukon Government)*	*Maurice.Colpron@gov.yk.ca*
Don Murphy	***Yukon Geology Program*** *(Yukon Government)*	*Don.Murphy@gov.yk.ca*
Charlie Roots	***Geological Survey of Canada*** *(Whitehorse)*	*Croots@NRCan.gc.ca*
JoAnne Nelson	***British Columbia Geological Survey*** *(Victoria)*	*joanne.nelson@gems1.gov.bc.ca*
Steve Gordey	***Geological Survey of Canada*** *(Vancouver)*	*Sgordey@NRCan.gc.ca*
Grant Abbott	***Yukon Geology Program*** *(Indian and Northern Affairs Canada)*	*Abbottg@inac.gc.ca*
Kaesy Gladwin	***University of Victoria*** *(Victoria)*	*kaesy@uvic.ca*

Till Sampling:

Surficial Geologists:

Jeff Bond	***Yukon Geology Program*** *(Indian and Northern Affairs Canada)*	*Jeff.Bond@gov.yk.ca*
Alain Plouffe	***Geological Survey of Canada*** *(Ottawa)*	*aplouffe@ NRCan.gc.ca*

Geological Assistants:

Robbie Cashin	*Carmacks*
Guy Buller	***Geological Survey of Canada*** *(Ottawa)*

GIS / Digital Cartography:

Panya Lipovsky	***Yukon Geology Program*** *(Yukon Government)*	*Panya.Lipovsky@gov.yk.ca*
Amy Stuart	***Yukon Geology Program*** *(Yukon Government)*	*Amy.Stuart@gov.yk.ca*

... 2.3 Crew

Camp Logistics:

Camp Manager:	***Joe Haggett***	***Volunteers:***	***Tony Wass, Bruce Skea, Barrett Mattesee***
Cook:	***Eileen McKie***		

Helicopter Crew:

Fireweed Helicopters

Pilots:	***Jock Mackay, Jon Pellow***
Apprentice:	***David West***

Security and Comic Relief:

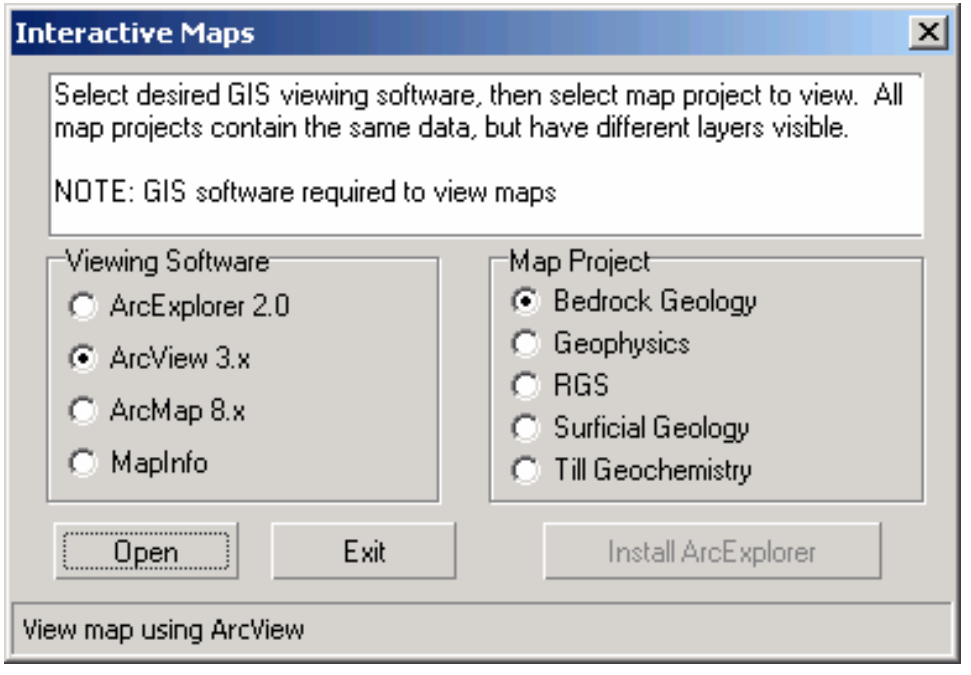
Topaz, Belle, Jasper, Keno, Ruby and ol' Kaleb

The 2002 Glenlyon TGI crew (from left to right): Charlie Roots, Kaesy Gladwin, Amy Stuart, Jock Mackay, Alain Plouffe, Robbie Cashin (foreground), Don Murphy (with dog, Belle), David West (in door), Guy Buller, Grant Abbott, Eileen McKie, Steve Gordey, JoAnne Nelson, Maurice Colpron (with dog, Ruby), Robin Black, Joe Haggett, Jeff Bond (with dog, Keno). Missing: Panya Lipovsky.

3.0 Interactive Maps

Interactive map projects are provided in four different GIS software formats:

1) *ESRI ArcExplorer* (*.aep)
2) *ESRI ArcView 3.x* (*.apr)
3) *ESRI ArcMap 8.x* (*.mxd)
4) *MapInfo* (*.wor)



Any one of these four software products must be installed on your computer in order to view an interactive map from the CD. Free *ArcExplorer 2.0* installation files are included with this CD. For first time users, *ArcExplorer* is an easy to learn, intuitive GIS map viewer with a reasonable range of capabilities. *MapINFO*, *ArcView 3.x* and *ArcMap 8.x* allow more powerful GIS analysis and querying capabilities, but must be purchased.

See the following sections for information regarding each software type.

...3.0 Interactive Maps Projects

Five projects are available for viewing in the four GIS software formats described above.

The same data is included in each of the five projects project, but different layers are made visible in order to save set up time for the user. Each project provides a starting point for browsing and querying the data, or from which customized thematic maps can easily be created. (To show legends for layers that have been minimized in a project, select the theme, and choose "hide/show legend" from the theme menu in ArcView. In ArcMap, simply click the "+" sign next to the layer name.)

Data from other sources (i.e. more detailed topography, private spatial data covering the same area, or data from the internet) can also be added to the maps, provided they are in the same projection.

To view the maps in any of the formats, click on **Maps**, and select the software you wish to use. Then select which map type to view and press the Open button.

Map Project Name		***Initial Display:***
(1)	bedrock (.aep,apr,mxd,wor)	*Bedrock geology map, structural symbols, fossils, geochronology and Yukon MINFILE overlain on 1:1 000 000-scale topography*
(2)	geophysics (.aep,apr,mxd,wor)	*Bedrock geology contacts and faults overlain on total field aeromagnetic image (from Geological Survey of Canada)*
(3)	geochem (.aep,apr,mxd,wor)	*Till geochemistry with gold results overlain on 1:1 000 000 scale topography; other elements can be turned on or off as desired.*
(4)	surficial (.aep,apr,mxd,wor)	*Surficial photo locations, and till clast lithology data overlain on surfical geological map (from Ward & Jackson, 1993)*
(5)	rgs (.aep,apr,mxd,wor)	*Regional geochemical survey (RGS) data overlain on 1:1 000 000 scale topography.*

IF YOU CAN NOT OPEN A MAP PROJECT:

- If you attempt to open an interactive map project with GIS software that is not installed on your computer, the following error message will appear:

Press OK, and choose the correct viewing software, or if you have none, install ArcExplorer 2.0.

- If you have the GIS software already installed on your computer, and the project will still not open from the interface, check your Windows file associations in Windows Explorer (For Windows XP, Go to Tools > Folder Options > File Types, and scroll through the list of extensions.) AEP files must be associated with ArcExplorer, APR files must be associated with ArcView 3.x, MXD files must be associated with ArcMap 8.x, and WOR files must be associated with MapInfo.

3.1 ArcExplorer™ 2.0

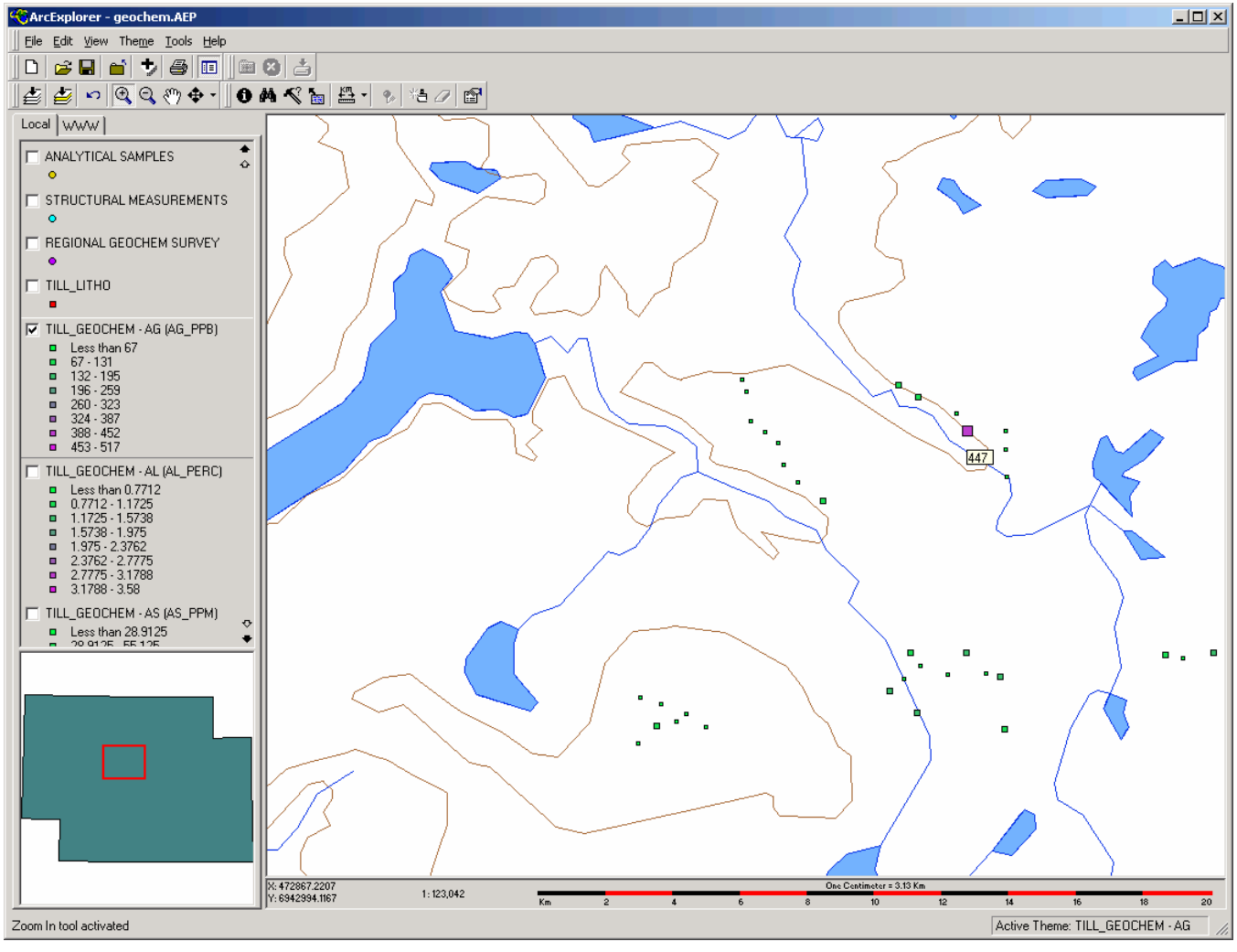
To install *ArcExplorer™ 2.0*, click on **Maps**, and choose "Install ArcExplorer" in lower right of the window. Follow the set up instructions on the screen and install the free software wherever desired on your hard drive. Consult the included *ArcExplorer™* help files for detailed instructions on how to use *ArcExplorer™*. Further information, support and software updates are available from the ESRI website: http://www.esri.com/software/arcexplorer/index.html.

Five *ArcExplorer™* projects (*.aep) are provided as interactive GIS maps. The projects were created in *ArcExplorer™* version 2.0, but should be compatible with any version of *ArcExplorer™*. To open the projects, use the Interactive Maps panel from the home interface, or start *ArcExplorer™*, select **Open Project** from the **File** menu and choose one of the five projects (*.aep located at ...*data**gis_projects**esri*). Each of the five *ArcExplorer™* projects contains the same data, but different layers are made visible. The projects provide starting points for data viewing and the creation of customized thematic maps.

A total of 81 themes (or layers) are listed with their corresponding symbology in the legend at the left side of the map window, in the legend bar. You can widen the legend bar if some of the legend text is cut off by placing the mouse over the right edge of the legend, and dragging to the right when a horizontal arrow icon is displayed. Turn themes on and off by clicking the check box to the left of the theme name. Experiment with displaying different combinations of themes. Use the Map Tips and Identify tools to explore the attribute data for individual features, or use the Query Builder tool to highlight multiple features in an active theme that meet custom criteria. You can print your map window, but only at the scale and extent visible on the screen, and you can not customize the layout.

ArcExplorer™ Tips and Tricks

For first time users, a few of the most useful functions of *ArcExplorer™* are highlighted below.



1) Active Theme: The layer that appears raised in the legend is the active theme. Click on a layer to make it the active theme. The active theme is reported in the bottom right corner of the map window (in the above figure, the active theme is TILL_GEOCHEM – AG.) Many of ArcExplorer's viewing capabilities take effect for the active theme only.

2) Scroll Themes: Scroll through the themes with the small arrow buttons in the top right  and bottom left corners  of the layer window. The solid scrolling arrows scroll very quickly through the list, which the hollow arrows scroll slowly.

3) Pan and Zoom: Use the pan and zoom tools  to move around the map. Zoom to the entire extents of the map  , or zoom to the extents of a particular theme  . You can also use the scroll bars at the right and bottom of the map to move around the map.

4) Overview Map: An overview map is shown in the bottom left corner of the map window, with the outline of the entire study area, and a red box showing the extent of the map window that is currently visible on your screen. You can move the red box around with the hand to pan the main map window. If the overview map is not visible, make the "Neatline" theme active, go to the "Theme" menu, and choose "Use in Overview Map".

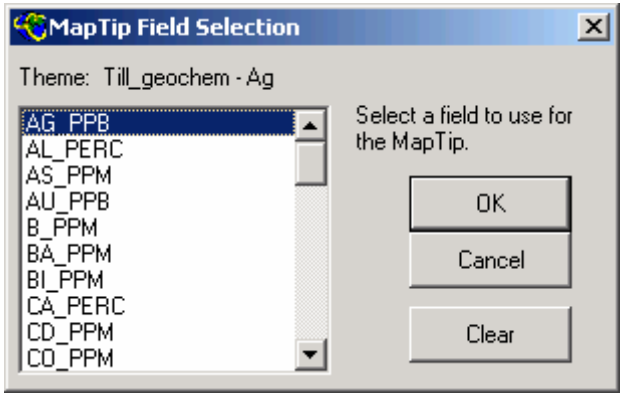
5) Scale: The scale is shown at the bottom of the window in three formats, as a numeric proportion, a textual representation, and as a visual scale bar.

6) Measure tool:  Click the arrow at the side of the ruler to select the desired measuring units (m, km, ft, or miles), then draw a line segment on the map and see the measured distance in the top left corner of the map window. If you make another measurement, the cumulative distance will be reported, as well as the individual segment distance.

7) Location: As you move the cursor around the map, the coordinates (UTM location in meters) are displayed in the bottom left corner of the map window.

8) Map Tips:  A value identifying a feature will be displayed when the mouse pointer passes over a feature contained in the active theme, regardless of what tool is selected. A map tip field has been pre-set for each layer. You can change what data is shown by activating a theme, clicking the map tips button, and selecting a new field to display.

For example, with the "Till_geochem – Ag" theme active, you could display the gold results in your map tips, instead of the default silver results, by choosing the AU_PPM field from the list shown at the right. This would allow you to see where the relative silver highs are on the map, while at the same time quickly being able to review gold values by passing the mouse over the sample points.



9) Identify tool:  Click on a feature in the active theme to bring up the Identify Results window showing all attribute data describing that feature. The location that you clicked is displayed in the top left of the window. You can change the dimensions of the Identify Results window to see all the data. Click on the "Field" label to sort the fields alphabetically. If you click on more than one feature at once, all the features will be listed at the left, under the Feature column, and you can select which feature's attributes to view. Close the Identify Results window when you are finished examining the attribute data.

You can drag and drop the results of an Identify into Microsoft Word or Excel. With the left mouse button, click one of the data fields listed in the Identify Results window. Then, drag and drop into the application of your choice.

10) Query tool:  A query expression is a precise definition of what you want to select and highlight on your map. You can only query the attribute data of the active theme. See ArcExplorer's help files for detailed information on building queries. Building a query expression is a powerful way to select features because an expression can include multiple attributes, operators, and calculations. For example, you could query a till geochemistry theme for samples that exceeded a certain amount of lead, and a certain amount of zinc. You could then zoom in on your map to the query results, or you could also drag and drop the results of the query into Microsoft Word or Excel.

3.2 ArcView™ 3.x Projects

Five *ArcView™ 3.x* projects (*.apr) are provided as interactive GIS maps. The projects were created in *ArcView™* version 3.2, but should be compatible with any version of *ArcView™ 3.x*. To open the projects, use the Interactive Maps panel from the home interface, or start *ArcView™ 3.x*, select **Open Project** from the **File** menu and choose one of the five projects (*.apr located at ..\data\gis_projects\esri). Attempting to open these projects by double-clicking the file in *Windows Explorer* may not work properly. If a message box asks "Where is …AV_GIS30\ARCVIEW\ext\hotlinkapi.avx?" hit cancel, and the project will open. (See next section to resolve this issue.)

Each of the five *ArcView™* projects contains the same data, but different layers are made visible. The projects provide starting points for data viewing and the creation of customized thematic maps. A total of 82 themes (or layers) are available for display and analysis.

For full functionality, the *ArcView™* projects must be opened from the CD; if the CD file structure has been copied to your hard drive, then the "Glenlyon_CD" folder (containing all the data from the CD) must be found in a root directory (i.e. immediately after the drive letter1).

Legend Symbology:

Legend files (*.avl) are included with each shapefile to allow reproduction of symbology in projects built from scratch or where Glenlyon shapefiles are added to pre-existing projects.

---

1 For example, the ArcView™ project file (.apr) must be located at: DRIVELETTER:\Glenlyon_CD\maps\Shape_Files\bedrock.apr, where DRIVELETTER is either your CD-ROM drive, or a hard drive letter to which all the data has been copied.*

Hyperlinking in ArcView™ 3.x

Hyperlinking (or hotlinking, as it is called in *ArcView™*) allows the user to click on a map feature and open an associated document (for example, a report or a photo.) With the *ArcView™* projects provided, you can hyperlink on three themes: **MINFILE – hyperlink, Bedrock Photos – Hyperlink** and **Surficial Photos – Hyperlink.**

To make use of this capability,

(1) *Adobe® Acobat Reader™* must be installed on your computer (free files provided on this CD-ROM or available at www.Adobe.com); and

(2) the extension, *HOTLINKAPI.AVX* (provided on this CD-ROM1) must be copied into the *ArcView™* extensions folder (..*ESRI\AV_GIS30\ARCVIEW\EXT32*), which is located where *ArcView™* is installed on your machine. This is a very small file (16 kb).

When you click on a MINFILE occurrence with the Hotlink tool in *ArcView™*, HOTLINKAPI will open a summary report describing the mineral occurrence in *Adobe® Acrobat™ Reader.* If you click on more MINFILE occurrences with the hotlink tool, their reports will be opened on top of the previous ones. The previous files will not be closed in Acrobat Reader; you must close the reports manually, or exit Acrobat Reader. When you click on a photo with the Hotlink tool, HOTLINKAPI will open the photo in whichever image editing software Windows associates with JPEG files on your machine (this could be Adobe Photoshop, Corel PhotoPaint, or Microsoft Photo Editor.)

This extension uses the Windows API (Application Programming Interface) to open a file with the program that Windows associates with its extension.

Portions of this work include intellectual property of Mel VanderWal and are used herein with permission. © Mel VanderWal (2002). All rights reserved.

3.3 ArcMap™ 8.x Projects

Five *ArcMap™ 8.x* projects (*.mxd) are provided as interactive GIS maps. The projects were created in *ArcMap™* version *8.2*, but should be compatible with any version of *ArcMap™ 8.x*. To open the projects, use the Interactive Maps panel from the home interface, or start *ArcMap™ 8.x*, select **Open Project** from the **File** menu and choose one of the five projects (*.mxd located at *..\data\gis_projects\esri*). Each of the five ArcMap projects contains the same data, but different layers are made visible. The projects provide starting points for data viewing and the creation of customized thematic maps. A total of 82 themes (or layers) are available for display and analysis.

Legend Symbology:

Layer (*.lyr) files are included with each shapefile so that symbology can be reproduced in map projects built from scratch, or where the Glenlyon shapefiles are added to pre-existing personal map projects. Projection (*.prj files are found in an *arcmap_projections* subfolder, found one level below the shapefiles. They are not included in the same folder as the shapefiles as this adversely affects the performance of the ArcExplorer projects. If you will be viewing the shapefiles using ArcMap, and will not be using ArcExplorer, the projection files should be copied into the same folders as the shapefiles so that ArcMap can recognize the projection.

Hyperlinking in ArcMap:

Select the hyperlink button  (the yellow lightning bolt), and all features with valid hyperlinks will be shown with a blue dot in the middle of their symbology. When you pass the hyperlink tool exactly over a blue dot, the hyperlink icon will change to a hand icon, and the path to the hyperlinked file will be displayed. With the hand icon, click on the hyperlinked feature, and the file will be opened using the appropriate software (Acrobat Reader for the MINFILE – Hyperlink layer, and whichever application Windows uses as a default photo viewer, for the Photos – Hyperlink layer.) If more than one document is hyperlinked at a single point, a window will list all available documents and you must choose which one to open.

3.4 MapInfo Workspaces

Five *MapInfo™* workspaces (*.wor) are provided as interactive GIS maps. The workspaces were created in *MapInfo™* version *5*, but should be compatible with any version of *MapInfo™*. To open the workspaces, use the Interactive Maps panel from the home interface, or start *MapInfo™*, select **Open Workspace** from the **File** menu and choose one of the five workspaces (*.wor located at *..\data\gis_projects\mapinfo*). Each of the five *MapInfo™* projects contains the same data, but different layers are made visible. The projects provide starting points for data viewing and the creation of customized thematic maps. A total of 38 themes (or layers) are available for display and analysis.

Legend Symbology:

MapInfo™ theme template files (.thm) have been provided for the bedrock and surficial geology layers, so that symbology can be reproduced in workspaces built from scratch, or where the Glenlyon tables are added to pre-existing workspaces. To load the theme templates, go to the **Options** menu, select **Preferences**, then choose the **Directories**, and under **Theme Templates** navigate to the theme template folder (*..data\gis_projects\mapinfo\theme_templates*). Alternatively, copy the *.thm files into your *..\MapInfo\THMTMPLT* folder where *MapInfo™* is installed on your harddrive, and this will add the Glenlyon templates to the list of default templates.

When creating a thematic map, choose type **Individual** and the various Glenlyon templates will be listed to choose from. The custom theme templates provided, and the tables and fields that should be used with each are listed at the right:

TEMPLATE NAME	TABLE	FIELD
Glenlyon_Geology	geology	mapunit
Glenlyon_bedrock_1999_YDG	geology_ydg	tgi_unit
Glenlyon_surficial_geology	surf_geol	class
Glenlyon_Contacts	contacts	reliabilit
Glenlyon_Faults	faults	reliabilit

InfoTips:

Like ArcExplorer MapTips, MapInfo's InfoTips display a value identifying a map object when the cursor is passed over the object. InfoTips are activated by the Select tool, Label tool and the Info tool. Each table layer can have a specific InfoTip for display, but the InfoTip for the topmost selectable layer will always be shown first. To see the InfoTips for a particular layer, move that layer to the top in the Layer Control dialogue.

3.5 AutoCAD™ Map

While no data on the CD is provided in *AutoCAD Map™* *.dwg format, shapefiles and their attribute tables can be quickly and easily imported into *AutoCAD Map™*.

Go to the **Map** menu, select **Tools > Import**, choose **ESRI Shape** under **Import Type**, and browse to the appropriate folder where the shapefiles are found. Check the desired shapefiles, specify a layer name for each shapefile (the default layer name is the same name as the shapefile). The default settings will not import attribute data, but you can select all or some specific fields if you wish to import the attribute data as object data.

4.0 Theme Descriptions

This section lists the themes (*ESRI* shapefiles and *MapInfo™* tables) that are available for viewing in the interactive map projects along with accompanying metadata (source, description, scale) and summaries of attribute data. There are 82 available themes, which can be subdivided into the following categories based on subject matter and data source:

Theme Category	Themes	Scale	Source
4.01) Bedrock Field Database	5	1: 50 000	YGP Field Data Collection - GeoFIELD database
4.02) Bedrock Geology	10	1: 125 000	YGP Open File 2002-9
4.03) Yukon MINFILE	1	1: 250 000	YGP Yukon MINFILE 2002
4.04) Isotopic Age Date	1	1: 250 000	YGP, Updated from Yukon Digital Geology, 1999
4.05) Fossil Collections	1	1: 250 000	YGP, Updated from Yukon Digital Geology, 1999
4.06) Surficial Geology Field Data	3	1: 50 000	YGP Field Data Collection – Surficial database
4.07) Surficial Geology Map Units	1	1: 100 000	GSC Maps 1786A-1789A, 1878A, 1879A
4.08) Till Geochemistry	40	1: 50 000	YGP Laboratory results
4.09) Regional Geochemical Survey	1	1: 50 000	GSC / YGP
4.10) Topographic Features	3	1: 1 000 000	ESRI Digital Chart of the World
4.11) Base Map Layers	7	1: 50 000	YGP / NRCan / Yukon Environment
4.12) Geophysical Images	7	30 m resolution	GSC / YGP
4.13) LandSat Images	2	15 m resolution	Geomatics Yukon / YGP

In the following tables, theme name refers to the name displayed in the legend of the interactive map projects; file name refers to the name of the shapefile or MapInfo table which underlies a theme, ArcExplorer Map Tip refers to the value displayed when a tool passes over a feature in the active layer of ArcExplore (or a feature in the topmost layer in MapInfo) and attribute data summarizes data associated with each feature which may be useful for queries or searches.

4.01 Bedrock Field Database Themes

These five point themes represent the locations of field observations and sample collections taken in the study area since 1998. The shapefiles were derived from the bedrock geology GeoFIELD database (*..\data\databases\ms_access\field_data\bedrock_geol\bedrock.mdb*). All locations were derived from GPS readings of UTM coordinates, with an accuracy on the order of 10 m.

The bedrock database theme shapefiles are found in the..*data\gis_projects\esri\bedrock_geol* folder. The corresponding MapInfo tables are found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Bedrock Stations	stations	station number	Location of field stations (points)	UTM coordinates (NAD83), nts sheet, geologist, station number, date, elevation
Bedrock Photos - Hyperlink	photos_hyper	caption	Location of field photographs, with active hyperlinks in ArcView 3.x and ArcMap 8.x (points)	station number, caption, UTM coordinates (NAD83), photographer, hyperlink file names, rock unit, date, and 50k mapsheet
Lithology Samples	lithology	rock type	Location of lithologic observation (points)	UTM coordinates (NAD83), station number, map unit, rock type, colour, grain size, texture, metamorphic indicators, mineralization.
Analytical Samples	samples	analysis type	Location of samples collected (points)	UTM coordinates (NAD 83), station number, type of analysis
Structural Measurements	structures	type of structural element	Point location of all structural measurements	UTM coordinates (NAD83), station number, structural element, azimuth and dip (or plunge) of structural element

4.02 Bedrock Geology

The first nine themes display geological line and polygon information as interpreted and shown on the new bedrock geology map of Glenlyon map area (Colpron et al., 2001 – Open File 2002-9). The mapping was done at a scale of 1:125 000 on 1:50 000 scale base maps. The last theme (Bedrock Geology 1999) is from the 1:250 000 scale Yukon Digital Geology compilation (Gordey and Makepeace, 1999).

All the bedrock geology theme shapefiles are found in the ..*data**gis_projects**esri**bedrock_geol* folder. The corresponding MapInfo tables are found in the *..\data\gis_projects\mapinfo\tables* folder.

...4.02 Bedrock Geology

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Structure Symbols (only visible at less than 1:250 000 scale)	structure_ symbols	structural feature	selected structural symbols scaled for 1:125 000 scale map (bedding, foliations, fold axes and lineations)	Structural feature type and GeoFIELD symbol name
Structure Text (only visible at less than 1:250 000 scale; not available in ArcExplorer)	structure_text	N/A	Dip and plunge text for structural symbols scaled for 1:125 000 scale map.	Dip or plunge
Contacts	contacts	N/A	Approximate and inferred geological contacts (lines)	Reliability (approximate or inferred)
Faults	faults	name	Approximate and inferred fault contacts (lines)	Fault type (thrust, strike-slip, normal), name, and reliability (approximate or inferred)
Fault Symbols 1	fault_symbols_ teeth	N/A	Thrust fault teeth and normal fault symbols sized for 1:125 000 scale map (polygons)	N/A
Fault Symbols 2	fault_symbols_ lines	N/A	Normal fault symbols for 1:125 000 scale map (lines)	N/A
Cross Sections	xsection_lines	name	Lines of cross section displayed on Open File 2002-9	Name (eg A-A')
Data Sources	data_sources	data source	Approximate extents of various data sources used to interpret geology (1: 250 000 scale)	Data source reference
Bedrock Geology 2002	geology	map unit	Geology polygons from 1: 125 000 scale 2002 mapping program (Open File 2002-9)	Map unit designator, unit name, age (numeric and period), rock class (layered or intrusive), setting (basin, fault zone, trough), formation, legend text, terrane, assemblage, legend colours.
Bedrock Geology 1999	geology_ydg	map unit (tgi_unit)	Geology polygons from 1:250 000 scale Yukon Digital Geology (1999) compilation. Provided as general reference for surrounding area only - Units along boundaries of 2002 extents may not match.	Regional unit, tectonic unit, terrane, era, period, rock class, rock type, numeric age, reassigned map unit (tgi_unit).

4.03 Yukon MINFILE

This theme displays point locations of all Yukon MINFILE occurrences in the Glenlyon study area. All information is extracted from Yukon MINFILE (2002). The location of most MINFILE occurrences is very approximate, on the order of 500 to 1000 m.

The MINFILE theme shapefile is found in the ..*data**gis_projects**esri**bedrock_geol* folder. The corresponding MapInfo table is found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Minfile - Hyperlink	minfile	Label showing MINFILE No., name, deposit type, and major commodities	Location of mineral occurrences with active hyperlinks in ArcView 3.x and ArcMap 8.x (points)	MINFILE No., UTM coordinates (NAD83), latitude and longitude (decimal degrees), deposit model, status, major commodities, name, hyperlink file names

MINFILE SUMMARY TEXT FILES

Adobe® Acrobat™ (PDF) text files summarizing each MINFILE occurrence in more detail (including work history and geological setting) can be viewed within the *ArcView™* 3.x and ArcMap 8.x projects on this CD-ROM by using the ***Hotlink*** or ***Hyperlink*** tools respectively (for more information see sections 3.2 and 3.3). The text files are from the Yukon MINFILE, 2001.

If the user does not have access to Arcview 3.x or ArcMap, the individual text files can also be opened directly in Acrobat Reader from the *..data\gis_projects\esri\hyperlinks\minfile* folder.

4.04 Isotopic Age Dates

This theme displays the point locations of specimens that have been dated using isotopic age dating techniques (Ar/Ar, K/Ar, and U/Pb). Detrital U/Pb dates and locations of pending dates are also included. Basic information is from the new Yukon Age 2002 CD (Breitsprecher et al., 2002), with modifications and additions of unpublished and pending data by M. Colpron and J.K. Mortensen. More detailed documentation for published geochronology (descriptions, interpretations and Concordia diagrams) are available on the Yukon Age CD (Breitsprecher et al., 2002).

All locations for samples taken by the Yukon Geology Program (sample numbers beginning with 98, 99, 00, 01, or 02) were derived from GPS readings of UTM coordinates, with an accuracy on the order of 10 m. The locations of all other samples are very approximate, with an accuracy on the order of 100 m.

The theme shapefile is found in the ..*data**gis_projects**esri**bedrock_geol* folder. The corresponding MapInfo table is found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Geochronology	geochron	Age (ma)	Location of isotopic age dates (points)	Sample no., age determination and error, dating method, mineral dated, lithology, map unit, interpretive notes, references, UTM coordinates (NAD83)

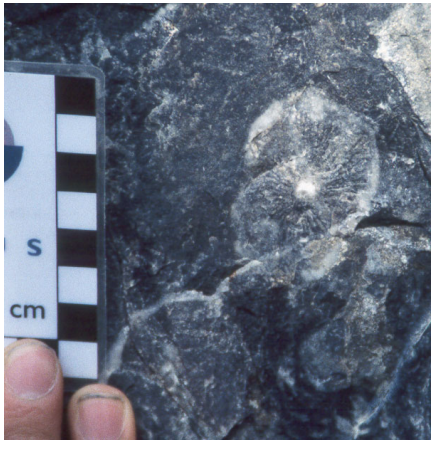
4.05 Fossils

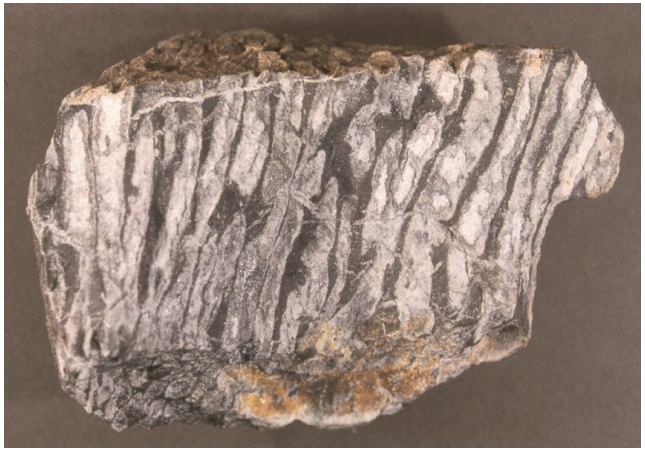
This theme displays the point locations of fossil specimens. Fossil information was extracted from Poulton et al. (1999) in the Yukon Digital Geology compilation (Gordey and Makepeace, 1999) and supplemented by additional collections by M. Colpron.

All locations for samples taken by the Yukon Geology Program (sample numbers beginning with 98MC or 99MC) were derived from GPS readings of UTM coordinates, with an accuracy on the order of 10 m. The locations of all other samples are very approximate; some samples are likely misplotted by a few kilometers.

The theme shapefile is found in the ..*data**gis_projects**esri**bedrock_geol* folder. The corresponding MapInfo table is found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Fossils	fossils	taxa	Location of fossil specimens (points)	Sample no., GSC locator no., taxa, age, data source, UTM coordinates (NAD83), map unit.





4.06 Surficial Geology Field Data

These three point themes represent the locations of field sites visited by surficial geologists during the 2002 till sampling program. 359 till samples were taken. Clast lihology analysis was completed for 30 of the till samples, mostly in the Clear Lake area (105L/14). The shapefiles for surficial stations and till clast lithologies were derived from the surficial geology database (*..\data\databases\ms_access\field_data\surficial_geol\surficial.mdb*). Information for the surficial photos shapefile was compiled from personal communications from the surficial geologists. All locations were derived from GPS readings of UTM coordinates, with an accuracy on the order of 10 m.

The theme shapefiles are found in the*..\data\gis_projects\esri\surficial_geol* folder. The corresponding MapInfo tables are found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Surficial Stations	surficial_samples	station number	Location of field stations (points)	UTM coordinates (NAD83), nts sheet, geologist, station number, date, elevation, slope, aspect, vegetation, drainage, till characteristics (matrix & clasts), soil profile, sample medium
Till Clast Lithology	till_litho	sample number	Location of till samples with clast lithology analysis results	Sample no., UTM coordinates (NAD83), percentages of clasts in various lithological classes (metamorphic, intrusive, volcanic, sedimentary, chert, limestone, conglomerate, quartz, oxidized clasts)
Surficial Photos - Hyperlink	surf_photos	caption	Location of field photographs, with active hyperlinks in ArcView 3.x and ArcMap 8.x (points)	Sample no., UTM coordinates (NAD83), caption, landform, hyperlink file name

4.07 Surficial Geology Map Units

This polygon theme is compiled from previous 1: 100 000 scale surficial geological mapping done by the Geological Survey of Canada (GSC). Digital files were obtained from the GSC for the Carmacks map area (115I – GSC Maps 1878A and 1879A; Jackson, 1997a,b). No digital files existed for the Glenlyon map area (105L – GSC Maps 1786A -1789A; Ward and Jackson, 1993a-d) so map units were digitized by hand from the paper maps at 1: 100 000 scale.

Due to inherent digitizing inaccuracies and the necessity of combining data from different formats and from different authors, there are some minor discrepancies in the spatial extents of this data. As a result, some polygons do not line up across map sheet boundaries. Overall, however, the dataset is extremely useful for identifying major areas that have been subject to specific glaciations, and areas covered by specific surficial materials.

The theme shapefile is found in the..*data**gis_projects**esri**surficial_geol* folder. The corresponding MapInfo table is found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Surficial Geology	surf_geol	Map unit and glaciation	surficial geology unit polygons	Map unit, original source, age, glaciation, surficial material origin, descriptive legend notes

4.08 Till Geochemistry

The results of the till geochemistry laboratory analysis are presented as a series of 40 themes – one for each element analyzed (Ag, Al, As, Au, B, Ba, Bi, Cd, Co, Cr, Cu, Fe, Ga, Hg, K, La, Mg, Mn, Mo, Na, Ni, Os, P, Pb, Pd, Pt, S, Sb, Sc, Se, Sr, Te, Th, Ti, Tl, U, V, W and Zn). Each of the 40 geochemistry themes are generated from the same single shape file (**till_geochem.shp**). Each data point can be linked to the Till Geochemistry table of the **Surficial Database**.

In *ArcView™* and *ArcMap™*, the geochemistry results are displayed in percentile classes (the values of the class breaks can be reviewed at *..data\databases\ms_excel\surficial_geol/geochem_percentiles.xls*). Each element (except for B, Os, Pd, and Pt, which do not have enough data variability to create percentile classes) is displayed with the same eight percentile classes to allow relative comparisons of anomalous results between elements. Percentile calculation statistics were performed on the entire till geochemistry sample set, with duplicate samples excluded. Field duplicates and control standards were used to evaluate the quality of the geochemical analyses. The results of these quality determinations are presented by Bond and Plouffe (2002).

ArcExplorer™ does not support the display of percentile classes, so in the *ArcExplorer™* projects, the geochemistry is displayed in eight classes. The values of the class breaks however, are different for each element. The actual value for a particular sample for the element dispayed in a theme (in %, ppm or ppb depending on the element) is displayed in *ArcExplorer™* as a Map Tip when the cursor is passed over a sample.

Due to time constraints, the 40 till geochemistry themes are not presented in *MapInfo™*. Instead, a single till geochemistry layer is provided, which can be browsed or thematically displayed for any element.

...4.08 Till Geochemistry

The theme shapefile is found in the..*data**gis_projects**esri**surficial_geol* folder. The corresponding MapInfo table is found in the *..**data**gis_projects**mapinfo**tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Till geochem (– Ag, Al, As, Au, B, Ba…)	till_geochem	Analysis result for element specified in theme name, in ppb, ppm, or %	Locations of laboratory analysis results for till geochemistry (points)	Sample no., analysis results for all elements analyzed, sample weight, UTM coordinates (NAD83)

4.09 Regional Geochemical Survey (RGS):

This theme consists of 1199 stream sediment geochemical sample points that have been collected under the Geological Survey of Canada's National Geochemical Reconnaissance Program with funding primarily from DIAND and YTG under cooperative agreements with the GSC. Analysis results are present for a variety of elements.

Further documentation on analysis and statistical methods, detection limits and measurement units are available from http://www.geology.gov.yk.ca/gallery/rgs/documentation.htm . The data was compiled by Daniele Heon, 2002.

The RGS theme shapefile is found in the ..*data\gis_projects\esri\surficial_geol* folder. The corresponding MapInfo tables are found in the *..\data\gis_projects\mapinfo\tables* folder.

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
RGS	rgs	Sample number	Locations of laboratory analysis results for stream sediment geochemistry (points)	Sample no., analysis results for all elements analyzed, sample weight, UTM coordinates (NAD83), drainage characteristics.

4.10 Topographic Features

These three themes display line and polygon base map topographic features (contours, lakes, and rivers) in the Glenlyon area. These themes are highly generalized and are only intended to provide a very basic orientation for the topographic features of the area.

All topographic themes are at 1:1 000 000 scale and were extracted from ESRI *Digital Chart of the World*. Please note that because of the large scale of this data set, the topographic data does not match perfectly with the rest of the themes, which are mostly at a scale of 1:50 000. This can be demonstrated when the lakes are shown to be offset on top of the LandSat images.

Due to NRCan copyright restrictions, it is not possible to distribute 1:50 000 scale topography, which portrays the topography far more accurately. If users own the more detailed 1:50 000 scale digital topographic data, they are encouraged to add these files to the interactive map projects instead of using the topographic themes provided on this CD.

The topographic theme shapefiles are found in the *..data\gis_projects\esri\base_map* folder. The corresponding MapInfo tables are found in the *..\data\gis_projects\mapinfo\tables* folder.

...4.10 Topographic Features

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Contours	contours	elevation	Topographic contours (lines)	Elevation (1000 ft intervals)
Lakes	lakes	N/A	Major waterbody polygons (lakes and large rivers)	N/A
Rivers	rivers	N/A	Major rivers and streams, and outlines of major water bodies (lines)	N/A
Roads	roads	name	Major highways, secondary roads, streets and limited use roads.	Road type, name, highway number, surface description, number of lanes, accuracy.

4.11 Other Base Map Layers

The first five of the following base map themes (neatlines, image mask and UTM grid) were digitized in house to fit with the 1: 50 000 scale boundaries and coordinate systems.

The roads theme is part of the Updated Road Network (URN) survey recently done by Natural Resources Canada. All roads were driven with a GPS, and are reported to have 5 m accuracy. They align well with the LandSat 7 image.

The first nations theme shows A and B block settlement lands at 1:250 000 scale. The data was compiled by Renewable Resources (Yukon Environment) in the year 2000 (http://www.renres.gov.yk.ca/pubs/rrgis/govdata.html). Site specific and community lands are not included. The theme is intended only to provide a general view of the distribution of major settlement lands in the study area. Legal records and higher quality settlement land data can be obtained from DIAND Claims and Indian Government (for Interim Protected unsurveyed/unfinalized lands) and Natural Resources Canada Legal Surveys Division (for surveyed blocks). All surveyed blocks are delineated by recent cutlines on the ground.

With the exception of the Geol Neatline theme (which is located in the *..data\gis_projects\esri\bedrock_geol* folder), the following theme shapefiles are found in the *..data\gis_projects\esri\base_map* folder. The corresponding MapInfo tables are found in the *..\data\gis_projects\mapinfo\tables* folder.

...4.11 Other Base Map Layers

Theme Name	File Name (*.shp, *.tab)	ArcExplorer Map Tip	Description	Attribute Data
Neatline	neatline	N/A	Polygon boundary for full extent of Glenlyon study area	N/A
Geol Neatline	geol_neatline	N/A	Polygon boundary for extent of 2002 bedrock geological mapping	N/A
Image Mask	neatline_mask	N/A	Polygon "donut" which, when displayed as a white polygon, will mask or cover imagery extending beyond the boundaries of the neatline.	N/A
Utm Grid	utm_grid	N/A	5000 m UTM (Nad 83, Zone 8) grid	UTM metres N or E
50K Mapsheets	50K_sheets	50K map number	Polygon outline of 1:50 000 NTS map sheets	Map number
Roads	roads	name	Major highways, secondary roads, streets and limited use roads (1:50 000 scale)	Road type, name, highway number, surface description, number of lanes, accuracy.
First Nations Settlement Lands	first_nations	first nation (abbreviated)	Category A and B settlement lands (1:250 000 scale) for Little Salmon Carmacks First Nation (LSC), Selkirk First Nation (SK)	Category, block number, first nation

4.12 Geophysical Images

These seven themes are raster images of regional aeromagnetics for the Glenlyon area. To create a 3D effect, the geophysical data are fused with a panchromatic hill-shaded 1:50 000-scale Digital Elevation Model (DEM). The resolution of the final images is 30 m.

The geophysical data were provided by the Geophysical Data Centre of the Geological Survey of Canada (note that this data is under crown copyright and as such should not be redistributed in any form to third parties). The DEMs were supplied by Geomatics Yukon. Geophysical data processing was performed by Carmel Lowe (GSC); image integration and processing was performed by Peter von Gaza.

The images were originally prepared in TIFF (*.tif) format and were converted into JPEG (*.jpg) format to create smaller file sizes. They are still relatively large files however, so users are cautioned when displaying these themes in the interactive map projects. Depending on the speed of your computer, display of the images could be slow.

World files (*.jpw for ESRI gis products) and table files (*.tab for MapINFO) are supplied for image georeferencing.
These files and the images themselves are found in the *..data\gis_projects\esri\raster\geophys_dem* folder.

...4.12 Geophysical Images

Theme Name	File Name (*.jpg, *.tab)	Description
Gravity 1	gravcarmeltopo_glenlyon	
Gravity 2	gravpvgtopo_glenlyon	
Horiz Gradient Mag	horzgradmagtopo_glenlyon	Horizontal gradient regional aeromagnetic
Vert Gradient Mag	vertgradmagtopo_glenlyon	Vertical gradient regional aeromagnetic
Total Mag	magtopo_glenlyon	Total field regional aeromagnetic
Mag Slope Gradient	mag_slope_gradient_glenlyon	Slope gradient regional aeromagnetic
Mag Equal	magequaltopo_glenlyon	

4.13 LandSat Images

These two themes are raster images of LandSat 7 data for the Glenlyon area. To create a 3D effect, the LandSat imagery was fused with a panchromatic hill-shaded 1:50 000-scale Digital Elevation Model (DEM). The resolution of the final LandSat images is 15 m. Both the DEM and the LandSat imagery were supplied by Geomatics Yukon and processed by Peter von Gaza. The images were originally prepared in TIFF (*.tif) format and were converted into JPEG (*.jpg) format to create smaller file sizes. They are still relatively large files however, so users are cautioned when displaying these themes in the interactive map projects. Depending on the speed of your computer, display of the images could be slow.

World files (for ESRI gis products) and tab files (for MapINFO) are supplied to ensure correct georeferencing of the images. The images, world files and MapInfo tables are found in the ..*data**gis_projects**esri**raster**satellite_dem* folder.

Two different band-colour combinations are provided, which portray the study area quite differently. 321 bands are true RGB colour bands, while the 543 bands are infrared bands which provide more powerful vegetation discrimination.

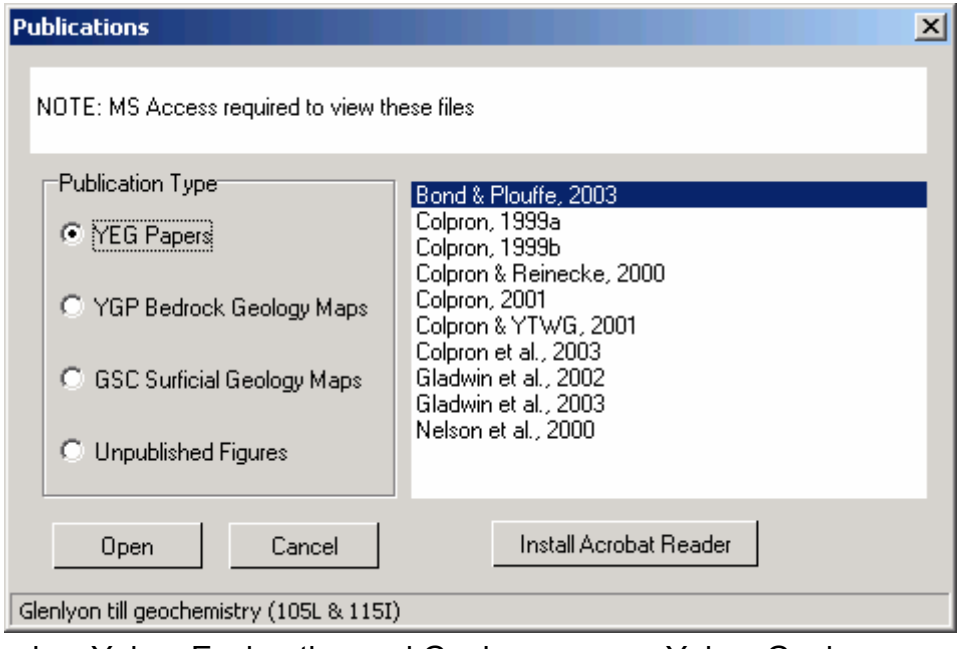
Theme Name	File Name (*.jpg, *.tab)	Description
LandSat 543	3_543fusex topomult90_ glenlyon.jpg	False colour (infrared) - LandSat image (bands 5,4,3) fused with 15 m panchromatic and hillshaded digital elevation model (DEM).
Landsat 321	321fusetopo_ glenlyon.jpg	True colour (RGB) - LandSat image (bands 3,2,1) fused with 15 m panchromatic and hillshaded digital elevation model (DEM)

5.0 Published Maps and Reports

Several publications are included on this CD. These include reports, maps and unpublished figures containing background information about the Glenlyon study area. They are provided in *Adobe®* Portable Document Format (*.pdf) and require *Acrobat Reader™* 3 or later to view (*Acrobat Reader™* 5 is provided on this CD).

To view any of these publications, go to the Publications panel, select a publication type and a specific item from the list.

The button at the lower right corner of the Publications panel will launch the installation of the free *Adobe® Acrobat Reader™ 5* software provided on this CD.



The publications are divided into four categories: Yukon Exploration and Geology papers, Yukon Geology Program bedrock geology maps, Geological Survey of Canda surficial geology maps, and unpublished figures.

... 5.0 Published Maps and Reports

5.1 YEG Papers

Geological reports published in the *Yukon Exploration and Geology* (YEG) series by the Yukon Geology Program.

List Name	Description	File Name (in folder *..publications\adobe_pdfs\yeg_papers*)
Bond & Plouffe, 2003	Glenlyon till geochemistry (105L & 115I)	Bond_YEG02.pdf
Colpron, 1999a	Little Kalzas Lake geology (105L/13)	Colpron_YEG98_1.pdf
Colpron, 1999b	Little Salmon Lake new mineral occurrence (105L/2)	Colpron_YEG98_2.pdf
Colpron & Reinecke, 2000	Little Salmon Range coherent stratigraphy (105L/1,2,7)	Colpron_YEG99.pdf
Colpron, 2001	Glenlyon YTT volcanic geochemistry (105L)	Colpron_YEG00.pdf
Colpron & YTWG, 2001	YTT stratigraphic comparison	Colpron_YTWG_YEG00.pdf
Colpron et al., 2003	Glenlyon bedrock geology (105L & 115I)	Colpron_YEG02.pdf
Gladwin et al., 2002	Geology, YTT-Cassiar contact (105L/1)	Gladwin_YEG01.pdf
Gladwin et al., 2003	Geology, Truitt Creek (105L/1)	Gladwin_YEG02.pdf
Nelson et al., 2000	YTT preliminary stratigraphic comparison	Nelson_YEG99.pdf

5.2 YGP Bedrock Geology Maps

Bedrock geology maps published by the Yukon Geology Program (YGP) as Indian and Northern Affairs Canada (INAC) Exploration and Geological Services Division (EGSD) Open File Maps.

List Name	**Description**	**File Name** (in folder *..publications\adobe_pdfs\ygp_maps*)
Little Kalzas Lake (105L/13), 1:50 000	EGSD Open File 1998-3 (Colpron, 1998)	OF1998_3.pdf
Little Salmon Lake (105L/1,2,7), 1:50 000	EGSD Open File 2000-10 (Colpron, 2000)	OF2000_10.pdf
Glenlyon (105L) & NE Carmacks (115I), 1:125 000	EGSD Open File 2002-9 / GSC Open File 1457 (Colpron et al., 2002)	OF2002_9.pdf
Truitt Creek (105L/1), 1:50 000	EGSD Open File 2002-5 (Gladwin et al., 2002)	OF2002_5.pdf
MINFILE (105L) 1:250 000	Yukon MINFILE Mineral Occurrence Map 105L	minfile_105L.pdf
MINFILE (115I) 1:250 000	Yukon MINFILE Mineral Occurrence Map 115I	minfile_115I.pdf

5.3 GSC Surficial Geology Maps

These maps were published by the Geological Survey of Canada (GSC) by Ward and Jackson (1993) at 1:100 000 scale. The maps are scanned images and are provided as a background reference to the surficial geology shapefiles (which were digitized from these maps) on this CD. The maps were not scanned at high resolution, so they may appear pixelated when zoomed in too close.

List Name	**Description**	**File Name** (in folder *..publications\adobe_pdfs\gsc_surficial_maps*)
NW 105L - Needlerock Ck	GSC Map 1786A	1786A.pdf
NE 105L - Wilkinson Range	GSC Map 1787A	1787A.pdf
SW 105L - Afe Ck	GSC Map 1788A	1788A.pdf
SE 105L - Telegraph Mtn	GSC Map 1789A	1789A.pdf

5.4 Unpublished Figures

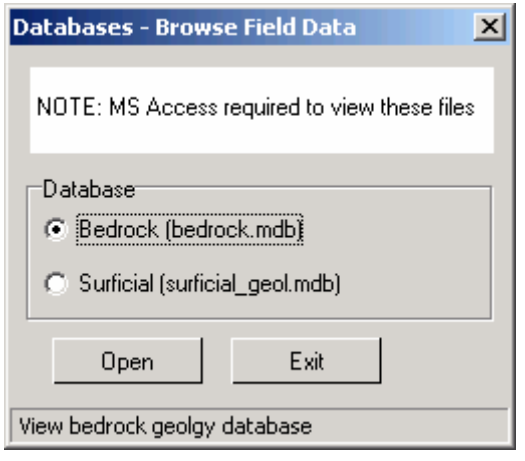
Various background figures which have not been published, or which come from parts of other publications.

List Name	Description	File Name (in folder *..publications\adobe_pdfs\unpub_figs*)
Clear Lake Till Clast Lithology	Detailed geology (1:10 000) with till lithology	clrlk_till_litho.pdf
Glenlyon Detrital Ages	Detrital ages in OF 2002-9 study area	detrital_ages.pdf
Glenlyon Fossils	Fossils in OF 2002-9 study area	fossils.pdf
Glenlyon Geochronology	Geochronology in OF 2002-9 study area	geochron.pdf
Glenlyon MINFILE	MINFILE in OF 2002-9 study area	minfile.pdf
YTT Correlations, 2001	Yukon-Tanana Working Group compilation, 2001	YTTcorr2001.pdf

6.0 Field Databases

The databases assembled during the Glenlyon field mapping program are included on this CD. Both the bedrock geology and surficial geology databases are provided in *MS Excel™* 95 (*.xls) and *MS Access™ 2000* (*.mdb) formats found in the *..data\databases* folder.

To most easily view the data, *MS Access™ 2000* software or above is required. Open the Databases panel (shown at the right) from the home interface, and select the desired database.



Advanced *MS Access™* users can perform customized queries and searches and reports on the databases. Consult the on-line help for guidance on performing database queries and reports.

To save any changes such as custom queries or reports to the databases, the database files must be copied to a hard drive and the read-only property must be removed from the files.

For users without *MS Access™ 2000*, all data tables from the *Access™* databases were exported to *MS Excel™*. The resultant *.xls files can be found in the *..\data\databases\ms_excel* folder.

6.1 Bedrock Geology

The bedrock geology database contains all the field information recorded by the bedrock geologists. During the 2002 field season, data was collected in the field using Palm OS handheld devices, and the results were downloaded daily to a ***GeoField*** database – the Yukon Geology Program's customized *MS Access™ 2000* field database application. Data collected between 1998 and 2001, was originally entered into a FieldLog database and subsequently imported into GeoField. Data includes information on stations, lithologies, structural measurements, samples and photos for 1818 stations that were visited in the field by various geologists since 1998. It also includes selected data compiled from previous maps and assessment reports.

Seven related data tables make up the bedrock geology database. The data from all the tables can be viewed together in a user friendly form named **Glenlyon Bedrock Geology Field Data** (see next page). Upon opening the database (located at *..\data\databases\ms_access\field_data\bedrock_geol\bedrock.mdb*), this form will automatically be displayed. (If the form does not display, go to **Forms**, and open the "Data Entry" form in the main database window.)

Bedrock Geology Database Tables:

Table Name	Description
MapUnits	Descriptions of lithological map units, as used in OF Map 2002-9
Station	Station location information
Structure	Structural measurements at a station
Photo	Catalogue of photographs at a station
Lithology	Lithological descriptions at a station
Sample	Samples collected at a station
Analysis Type	Analysis types selected for specific samples

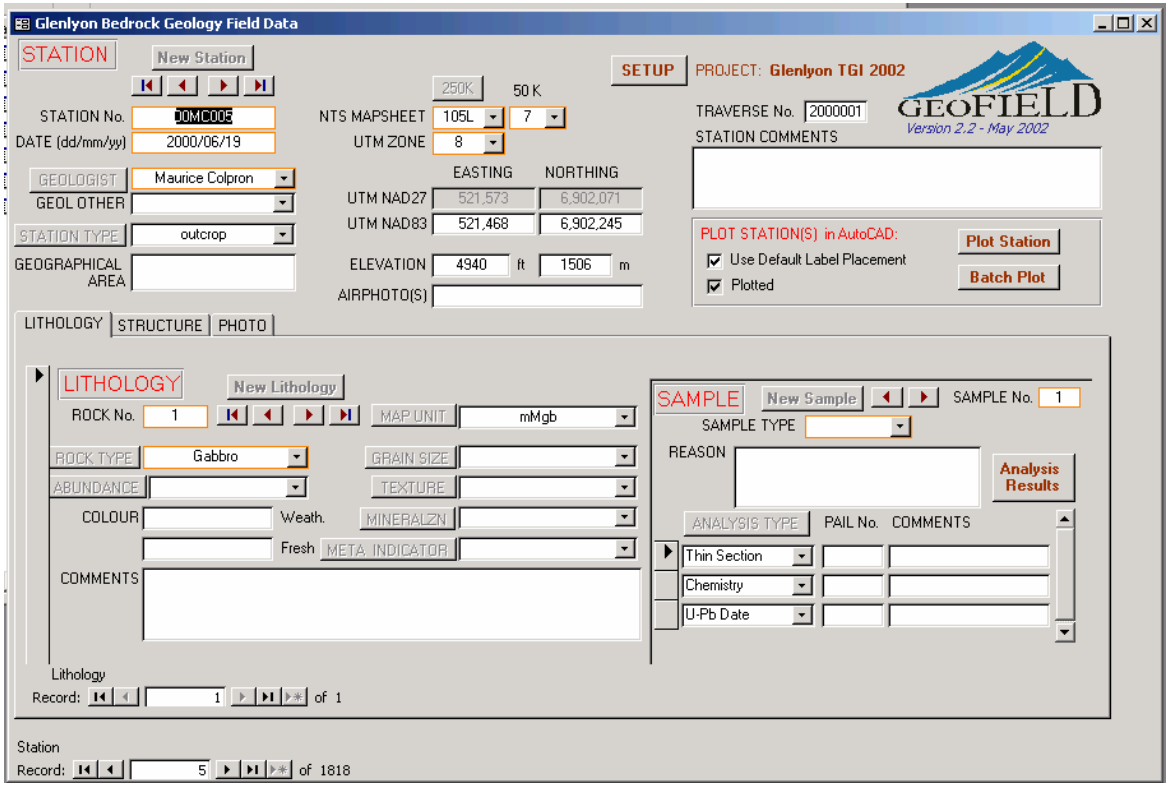
...6.1 Bedrock Geology

Upon opening the database you will encounter the following error message:

Click OK to enter the GeoField form.

To navigate between records in the *MS Access™* form, use the **Record Selectors** () at the bottom of the form, or use the **arrow keys** () within the form.

Note that a single station can have multiple lithology, structure or photo records.



6.1.1 GeoFIELD

GeoField is a data management system which is designed to facilitate data entry/recording and the production of geologic maps while in the field. ***GeoField*** is simply a customized *MS Access™ 2000* database which interacts with *AutoCAD Map™ 2000* to allows digitizing and plotting of station locations and structural data using a *Visual Basic for Applications* interface.

A blank GeoFIELD database (*..\software\geofield\geoFIELD_v2_2_blank.mdb*) is included on the CD, along with a full manual for its use. Users are welcome to use it for their own field data management.

For more information on ***GeoField*** see the manual (*..\software\geofield\geoFIELD Manual_v2_2.pdf*), visit the Yukon Geology Program website (www.geology.gov.yk.ca) or contact Panya.Lipovsky@gov.yk.ca or Maurice.Colpron@gov.yk.ca.

6.2 Surficial Geology

The surficial geology database (*..\data\databases\ms_access\field_data\surficial_geol\surficial_geol.mdb*) contains the field information recorded by surficial geologists during the till sampling program. Surficial geology data was collected in the field using IPAQ handheld devices, which stored information in shapefile DBASE format directly in the field. The DBASE files were then imported into Access for ease of viewing.

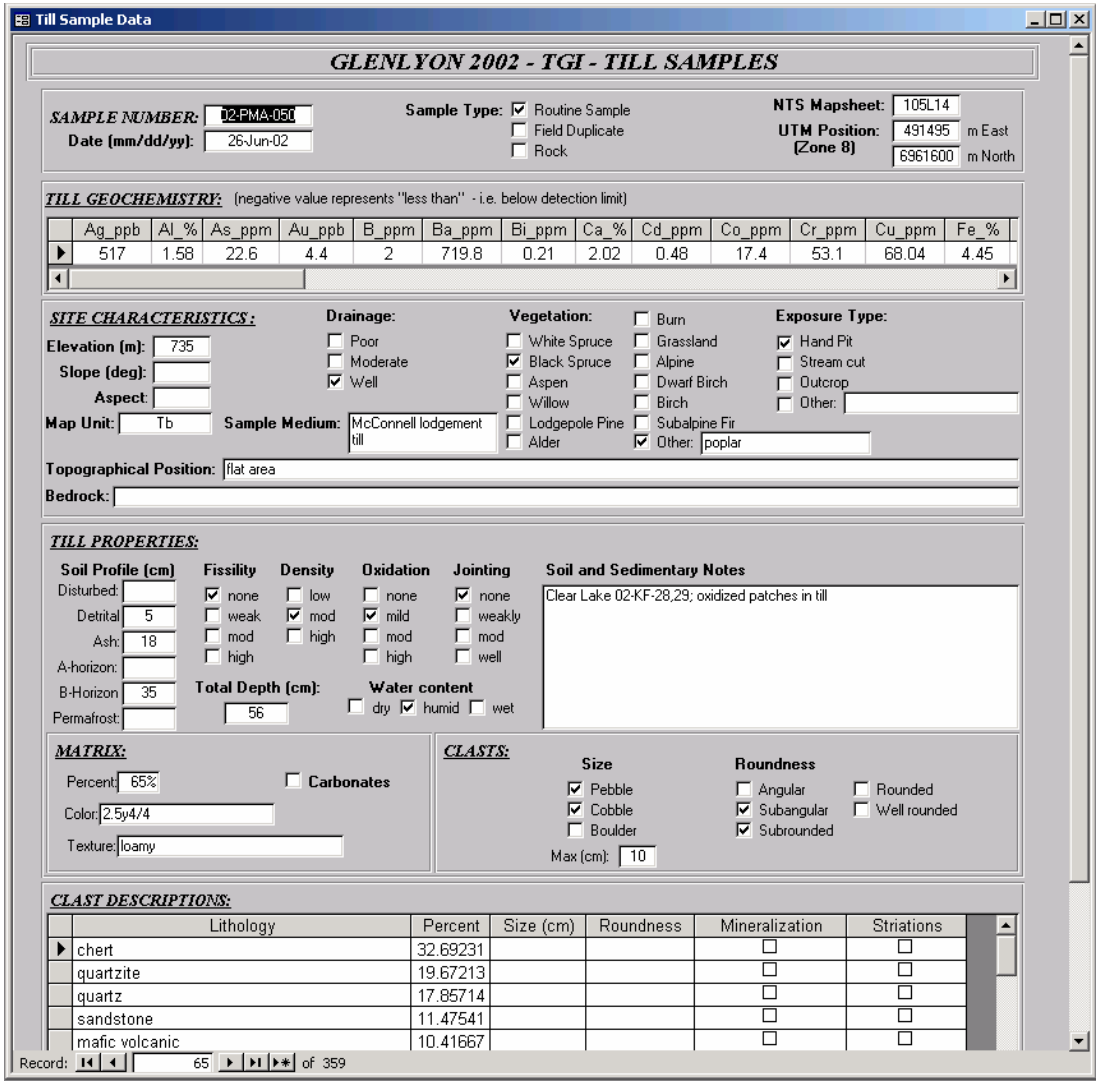
The surficial geology database provides information on station and site characteristics, till geochemistry, till properties, clast lithology and matrix descriptions for 359 samples. It also contains geochemical analysis results for the till samples.

Four related data tables (see below) make up the surficial database. The data from the first three tables can be viewed together in a user friendly form, named **Till Sample Data** (see next page). This form will automatically display upon opening the database. (If the form does not display, go to **Forms**, and open the Till Sample Data form in the main database window.) The data in the Geochem_percentiles table is given as a reference only. The percentile values were used to delineate classes for symbolizing the legends in the interactive maps.

Surficial Geology Database Tables:

Table Name	Description
2002 Field Data	sample data collected in the field
Lithology	till clast lithology analysis results
Till Geochemistry	till geochemistry analysis results
Geochem_percentiles	percentile classes used to symbolize geochemistry legends for interactive maps

... 6.2 Surficial Geology



Use the **Record Selector** arrows at the bottom of the window or the **Find** button to navigate between sample numbers.

7.0 Photo Gallery

Bedrock geology field photos are included on the CD to provide an opportunity for users to closely examine the various rock types encountered in the study area. Surficial geology photos have also been included to showcase the Glenlyon area landscape and its representative landforms.

The photos are provided in JPEG (*.jpg) format, at a resolution of 100 dpi (approximately 800 x 550 pixels) and are located in the *..\data\gis_projects\esri\hyperlinks\photos* folder.

The photos can be accessed from the CD home panel, by opening the Photo Gallery interface. This is a customized photo viewer, designed by Peter Von Gaza. Using this interface, the bedrock photos can be searched by station number, map unit, terrane, structure and mineralization. The surficial photos can be searched by landform. Scenic photos, and photos of the camp and crew are also included. When a category is selected, a list will be generated listing the names of the digital photo files in a particular category. When a single file name is selected from this list, an enlarged view of the photo will appear, with its associated caption.

Alternatively, the photos can be viewed through hyperlinks in the ArcView 3.x and ArcMap 8.x interactive map projects (see section 3.2 and 3.3). The hyperlink will open the image in the default image viewing software, such as Microsoft Photo Editor, Corel PhotoPaint, or Adobe PhotoShop.

8.0 Recommended Citation

Colpron, M., Bond, J.D., Lipovsky, P.S., Gladwin, K., Gordey, S.P., Murphy, D.C., Nelson, J.L., Plouffe, A., Roots, C.F., and Abbott, J.G., 2003, Digital compilation of bedrock geology and till geochemistry, Glenlyon (105L) and eastern Carmacks (115I) map areas, Yukon Territory; Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Open File 2003-7(D) and Geological Survey of Canada Open File 1561.

9.0 Other Geoscience Information and Sales

Yukon Geology Program:

Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada publishes Yukon Geology Program publications. Copies of this CD-ROM and other Yukon Geology Program publications are available at the address below.

Geoscience Information and Sales
c/o Whitehorse Mining Recorder
102-300 Main Street
Whitehorse Yukon Y1A 2B5
Ph. (867) 667-3266
Fax. (867) 667-3267
Email: geosales @inac.gc.ca

Yukon Geology Program also distributes publications in digital format. To download publications free of charge visit: http://geology.gov.yk.ca/ .

Geological Survey of Canada (Vancouver):

General Information:

Geological Survey of Canada
101-605 Robson St.
Vancouver, British Columbia
V6B 5J3
http://www.nrcan.gc.ca/gsc/index_e.html

Maps and Publications Sales:
Phone 1 - 604 - 666-0271
Fax 1 - 604 - 666-1337
http://www.rodus.com/shop/

10.0 References

Bond, J.D., 1997. Late Cenozoic History of McQuesten (115P), Yukon Territory. Unpublished M.Sc. thesis, University of Alberta, Edmonton, Alberta, 161 p.

Bond, J. D., 2001. Quaternary geology and till geochemistry of the Anvil district (parts of 105K/2, 3, 5, 6 and 7), central Yukon Territory. Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Bulletin 11, 38 p.

Bond, J.D. and Plouffe, A., 2002. Finlayson Lake Targeted Geoscience Initiative (southeastern Yukon), Part 2: Quaternary geology and till geochemistry. In: Yukon Exploration and Geology 2001, D.S. Emond, L.H. Weston and L.L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 209-228 plus 10 fold-out maps.

Bond, J.D., Murphy, D.C., Colpron, M., Gordey, S.P., Plouffe, A., Roots, C.F., Lipovsky, P.S., Stronghill, G. and Abbott, J.G., 2002. Digital compilation of bedrock geology and till geochemistry of northern Finlayson Lake area, southeastern Yukon (105G). Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, also Geological Survey of Canada Open File 4243.

Bond, J.D. and Plouffe, A., 2003. Yukon Targeted Geoscience Initiative, Part 2: Glacial history, till geochemistry and new mineral exploration targets in Glenlyon and eastern Carmacks map area, central Yukon. *In*: Yukon Exploration and Geology 2002, D.S. Emond and L.L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 109-134.

Bostock, H.S., 1936. Carmacks district, Yukon. Geological Survey of Canada, Memoir 189, 67 p.

Bostock, H.S., 1947. Mayo, Yukon Territory. Geological Survey of Canada, Map 890A, 1:253 440.

Bostock, H.S., 1964. Geology, McQuesten, Yukon Territory. Geological Survey of Canada, Map 1143A, 1:253,440.

Bostock, H.S. and Lees, E.J., 1938. Laberge map-area, Yukon. Geological Survey of Canada, Memoir 217, 33 p.

Breitsprecher, K., Mortensen, J.K. and Villeneuve, M.E., 2002. Yukonage 2002: A database of isotopic age determinations for rock units from Yukon Territory, Canada. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Whitehorse, Yukon.

Campbell, R.B., 1967. Geology of Glenlyon map-area, Yukon Territory (105 L). Geological Survey of Canada, Memoir 352, 92 p.

Cockfield, W.E., 1929. Little Salmon area, Yukon. In: Summary Report 1928, part A, Geological Survey of Canada, p. 1-10.

Colpron, M., 1998. Preliminary geological map of Little Kalzas Lake area, central Yukon (NTS105L/13). Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 1998-3, 1:50 000.

Colpron, M., 1999a. Glenlyon Project: Preliminary stratigraphy and structure of Yukon-Tanana terrane, Little Kalzas Lake area, central Yukon (105L/13). In: Yukon Exploration and Geology 1998, C.F. Roots and D.S. Emond (eds.), Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 63-72.

Colpron, M., 1999b. A new mineral occurrence in Yukon-Tanana terrane near Little Salmon Lake, central Yukon (NTS 105L/2). In: Yukon Exploration and Geology 1998, C.F. Roots and D.S. Emond (eds.), Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 255-258.

Colpron, M., 2000. Geological map of Little Salmon Lake (parts of NTS 105L/1, 2 & 7), central Yukon (1:50 000 scale). Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 2000-10,

Colpron, M., 2001. Geochemical characterization of Carboniferous volcanic successions from Yukon-Tanana terrane, Glenlyon map area (105L), central Yukon. In: Yukon Exploration and Geology 2000, D.S. Emond and L.H. Weston (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 111-136.

Colpron, M. and Reinecke, M., 2000. Glenlyon Project: Coherent stratigraphic succession from Little Salmon Range (Yukon-Tanana Terrane), and its potential for volcanic-hosted massive sulphide deposits. In: Yukon Exploration and Geology 1999, D.S. Emond and L.H. Weston (eds.), Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 87-100.

Colpron, M. and Yukon-Tanana Working Group, 2001. Ancient Pacific Margin - An update on stratigraphic comparison of potential volcanogenic massive sulphide-hosting successions of Yukon-Tanana terrane, northern British Columbia and Yukon. In: Yukon Exploration and Geology 2000, D.S. Emond and L.H. Weston (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 97-110.

Colpron, M., Murphy, D.C., Nelson, J.L., Roots, C.F., Gladwin, K., Gordey, S.P. and Abbott, J.G., 2003. Yukon Targeted Geoscience Initiative, Part 1: Results of accelerated bedrock mapping in Glenlyon (105L/1-7,11-14) and northeast Carmacks (115I/9,16) areas, central Yukon. *In*: Yukon Exploration and Geology 2002, D.S. Emond and L.L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 85-108.

Colpron, M., Murphy, D.C., Nelson, J.L., Roots, C.F., Gladwin, K., Gordey, S.P., Abbott, G. and Lipovsky, P.S., 2002. Preliminary geological map of Glenlyon (105L/1-7,11-14) and northeast Carmacks (115I/9,16) areas, Yukon Territory (1:125 000 scale). Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Open File 2002-9, also Geological Survey of Canada, Open File 1457.

Dawson, G.M., 1888. Report on an exploration in Yukon district, Northwest Territories, and adjacent portions of British Columbia. In: Annual Report 1887-1888, Geological Survey of Canada, vol. 3, pt. B, p. 1-183.

Gladwin, K., Colpron, M., Johnston, S.T. and Black, R., 2002a. Geology at the contact between Yukon-Tanana and Cassiar terranes, southeast of Little Salmon Lake (105L/1), south-central Yukon. In: Yukon Exploration and Geology 2001, D.S. Emond, L.H. Weston and L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 103-109.

Gladwin, K., Colpron, M. and Black, R., 2002b. Geology of Truitt Creek (NTS 105L/1) map area, central Yukon (1:50 000 scale). Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Open File 2002-5.

Gladwin, K., Colpron, M., Black, R. and Johnston, S.T., 2003. Bedrock geology at the boundary between Yukon-Tanana and Cassiar terranes, Truitt Creek map area (105L/1), south-central Yukon. In: Yukon Exploration and Geology 2002, D.S. Emond and L.L. Lewis (eds.), Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, p. 135-148.

Gordey, S.P. and Makepeace, A.J., 1999. Yukon digital geology. Geological Survey of Canada, Open Files D3826 and Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Open File 1999-1(D).

Hughes, O.L., 1982. Surficial Geology and Geomorphology – Mayo (105 M SW, SE, NW, NE). Geological Survey of Canada, 1:100 000 scale.

Jackson, L.E. Jr., 1997. Surficial geology, Granite Canyon, Yukon Territory; Geological Survey of Canada, Map 1878A, scale 1:100 000.

Jackson, L.E. Jr., 1997. Surficial geology, Tantalus Butte, Yukon Territory; Geological Survey of Canada, Map 1879A, scale 1:100 000.

Jackson, L.E., Jr., 2000. Quaternary geology of the Carmacks map area, Yukon Territory. Geological Survey of Canada, Bulletin 539, 74 p.

Johnston, J.R., 1936. A reconnaissance of the Pelly River between Macmillan River and Hoole Canyon, Yukon. Geological Survey of Canada, Memoir 200, 19 p.

LeBarge, W.P., Bond, J.D. and Hein, F.J., 2002. Placer gold deposits of the Mayo area, central Yukon. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada, Bulletin 13, 209 p.

McConnell, R.G., 1903. The Macmillan River district, Yukon. In: Annual Report 1902, Geological Survey of Canada, p. 22-38.

Nelson, J.L., Mihalynuk, M.G., Murphy, D.C., Colpron, M., Roots, C.F., Mortensen, J.K. and Friedman, R.M., 2000. Ancient Pacific Margin: A preliminary comparison of potential VMS-hosting successions of the Yukon-Tanana Terrane, from Finlayson Lake district to northern British Columbia. *In:* Yukon Exploration and Geology 1999, D.S. Emond and L.H. Weston (eds.), Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 79-86.

Oliver, D.H., 1996. Structural, kinematic, and thermochronologic studies of the Teslin suture zone, south-central Yukon Territory. Unpublished Ph.D. thesis. Southern Methodist University, 231 p.

Oliver, D.H. and Mortensen, J.K., 1998. Stratigraphic succession and U-Pb geochronology from the Teslin suture zone, south central Yukon. In: Yukon Exploration and Geology 1997, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p. 69-75.

Poulton, T., Orchard, M.J., Gordey, S.P. and Davenport, P., 1999. Selected Yukon fossil determinations. *In*: Yukon digital geology, S.P. Gordey and A.J. Makepeace (eds.), Geological Survey of Canada, Open File D3826, and Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, Open File 1999-1(D).

Tempelman-Kluit, D.J., 1984. Geology, Laberge (105E) and Carmacks (105I), Yukon Territory. Geological Survey of Canada, Open File 1101, 1:250 000.

Shilts, W.W., 1976. Glacial till and mineral exploration. In Glacial till: an interdisciplinary study, R. F. Legget (ed.), Royal Society of Canada, Special Publication 12, Toronto, Ontario, p. 205-224.

Shilts, W.W., 1993. Geological Survey of Canada' s contributions to understanding the composition of glacial sediments. Canadian Journal of Earth Sciences, v. 30, p. 333-353.

Ward, B.C., 1989. Quaternary stratigraphy along Pelly River in Glenlyon and Carmacks map areas, Yukon Territory. In: Current Research, Part E; Geological Survey of Canada, Paper 89-1E. p. 257-264.

Ward, B.C., 1993. Quaternary geology of the Glenlyon map area (105 L), Yukon Territory; Ph.D. thesis, University of Alberta, Edmonton, 222 p.

Ward, B.C. and Jackson, L.E. Jr., 1992. Late Wisconsinian glaciation of the Glenlyon Range, Pelly Mountains, Yukon Territory, Canada. Canadian Journal of Earth Sciences, vol. 29, p. 2007 - 2012.

Ward, B.C., and Jackson, L.E., Jr., 1993. Surficial geology, Needlerock Creek, Yukon Territory. Geological Survey of Canada, Map 1786A, scale 1:100 000.

Ward, B.C., and Jackson, L.E., Jr., 1993. Surficial geology, Wilkinson Range, Yukon Territory. Geological Survey of Canada, Map 1787A, scale 1:100 000.

Ward, B.C., and Jackson, L.E., Jr., 1993. Surficial geology, Afe Creek, Yukon Territory. Geological Survey of Canada, Map 1788A, scale 1:100 000.

Ward, B.C., and Jackson, L.E. Jr., 1993. Surficial geology, Telegraph Mountain, Yukon Territory. Geological Survey of Canada, Map 1789A, scale 1:100 000.

Ward, B.C. and Jackson, L.E. Jr., 2000. Surficial geology of the Glenlyon map area, Yukon Territory. Geological Survey of Canada, Ottawa, Bulletin 559, 60 p.

Yukon MINFILE, 2002. Exploration and Geological Services Division, Yukon Region, Indian and Northern Affairs Canada.