

# User Manual for SEDMODL2

## Scenario Modeler

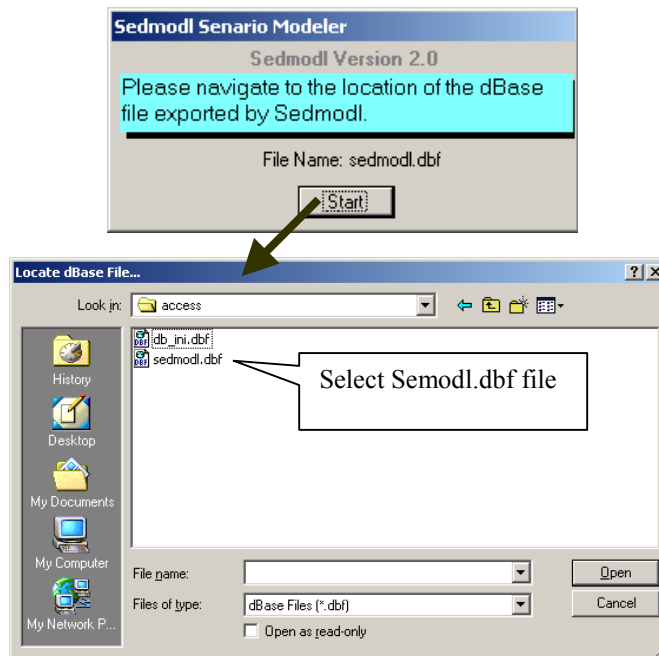
With SEDMODL2, users are able to perform post Arc/Info attribute based modeling using Microsoft Access. SEDMODL2 performs spatially explicit modeling of ArcInfo coverages and an elevation grid. Once this modeling is complete a user can edit model parameters and recalculate sediment generation within Access. The application also allows the user to view the GIS outputs through a MapObjects component distributed with the application.

The provided runtime version of Access does not require a user to have a licensed copy of Access installed on their personal computer (PC). Please see attachment A for minimum system configuration.

Experienced Access users will be able to take advantage of the powerful query capabilities built into Access. New users of Access or less experienced users will be able to utilize custom menu choices to locate and update records, model parameters, and coefficients.

SEDMODL2 creates a directory structure containing output coverages, a map composition directory, an ArcPlot graphics file, an AML file, dBase files, a shapefile, and a model run documentation file. SEDMODL2 Users are offered an opportunity to start the Access application at the end of a model run.

When starting the application, the user is presented with a startup form that will then ask the user to navigate to, and select the “SEDMODL2.dbf” file. The file exists in the same directory as the Access application and will be readily visible to the user.



After selecting the file click on the “Open” button.

The Access application will then import the data from the Arc/Info model run and populate several tables with the data. Access automatically imports and utilizes information stored in the db\_ini.dbf. The application will notify the user when the import is complete. The data are read into two main tables: aaaSedmodl and tblModelFactors. The fields in each table are listed in Tables A and B.

**Table A - aaaSedmodl**

<b>Field Name</b>	<b>Description</b>
Arc_ID	Unique identifier from ArcInfo coverage.
Seg_ID	Unique identifier from the SEDMODL2 output road coverage.
Length	Length of feature in feet. Meters converted to feet on import.
Flag	A toggle field used during queries and updates to records.
RdClass	The type of road class.
RdSurf	The type of road surfacing for surface factor calculations.
RdWidth	The average road width.
RdUse	Level of road use for traffic factor calculations.
RdGradient	The average road gradient, as determined by the elevation model or road inventory.
Rdcutslpht	The average cutslope height.
Cutslpveg	The average cutslope vegetative or non-erosive cover.
Rdprism	The road prism geometry (Outsloped, insloped, or crowned)
Constructyr	The year of construction.
RdArea	The acreage of the road tread.
TreadSed	The amount of sediment generated from the road tread.
CutslpSed	The amount of sediment generated from the cutslope.
TtlSed	The combined sediment from tread and cutslope sediment.
Delcode	The delivery type (direct or indirect).
OldFlag	Container for saved flag values.

**Table B - tblModelFactors**

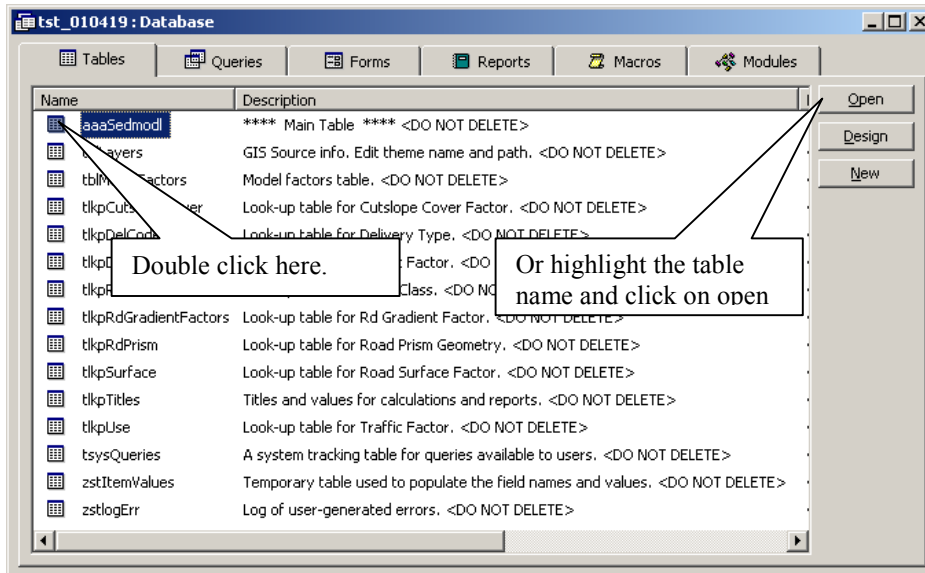
<b>Field Name</b>	<b>Description</b>
Arc_ID	Unique identifier from the SEDMODL2 output road coverage.
GER	Geologic erosion rate from geology coverage.
Prefc	Rainfall factor.
Rgf	Road gradient factor.
Sf	Surface factor.
Tf	Traffic factor.
Df	Delivery factor.
Ccf	Cutslope cover factor.
ModelLen	The length value used by the model.
ModelWidth	The width value used by the model.
CutSlpArea	The acreage of the cutslope.

The db\_ini.dbf file read in by the Access application is used to:

- Identify the metrics used by ArcInfo (feet or meters)
- The project area title.
- The name and location of GIS data that will be utilized by the Access application GIS component.

Look-up tables exist in the application prior to loading the ArcInfo outputs. These look-up tables can be edited directly or through menu selections described latter in this document. These look-up tables contain valid values for model parameters and associated factors used by the model.

To open a table you can double click the table name with your mouse button or highlight the name and click on the “Open” button on the database window.



You can add and create new tables to the application but make certain that you do not delete any tables that have <DO NOT DELETE> in their description.

The look-up tables are described in Tables C through L.

**Table C - tlkpCutslopeCover**

Cutslope Cover Range	Cutslope Cover Factor
0% - 9%	1
10% - 19%	0.77
20% - 29%	0.6155
30% - 39%	0.5222
40% - 49%	0.4435
50% - 59%	0.3742
60% - 69%	0.3116
70% - 79%	0.254
80% - 89%	0.2003
90% - 99%	0.15
100%	0.1023

Table C shows the values for the Cutslope Cover Factors look-up table (tlkpCutslopeCover). The “Cutslope Cover Range” field shows the legal range of percent cover, the “Cutslope Cover Factor” contains the factors used by the model to calculate cutslope sediment. Never alter the values in the “Cutslope Cover Range” field. The “Cutslope Cover Factor” field values can be edited.

**Table D - tlkpDeliveryFactors**

Delivery Code	Delivery Type	Delivery
1	Direct	1
2	Indirect - 100ft	0.35
3	Indirect - 200ft	0.1

Table D contains look-up values for the Delivery code in the aaaSedmodl table. Do not edit the “Delivery Code” or “Delivery Type” fields. You can edit the delivery factors in the “Delivery” field.

**Table E - tlkpRdClass**

Road Class
ABANDONED/BLOCKED
COUNTY ROAD
HIGHWAY
MAIN HAUL
PRIMARY ROAD
SECONDARY ROAD
SPUR ROAD

Table E contains suggested values for Road Class. Road Class is not used directly by the model but this attribute can provide a convenient way to group roads into categories that represent combinations of road surface type, road width, level of road use, etc. You can edit this table or the Road Class field in the aaaSedmodl table without any undesired consequences to the model run.

**Table F - tlkpRdPrism**

Rd Prism Geometry
CROWNED
INSLOPED
OUTSLOPED

Table F contains legal values for Road Prism Geometry. Do not edit this table.

**Table G - tlkpSurface**

Surface Type	Surface Factor
ASPHALT	0.03
GRASSED NATIVE	0.50
GRAVEL	0.20
GRAVEL WITH RUTS	0.40
NATIVE	1.00
NATIVE WITH RUTS	2.00
PIT RUN	0.49

Table G contains legal values for the Road Surface Type in the aaaSedmodl table and the associated factors used by the model. Do not edit the “Surface Type” field. You can edit the Surface Factor field.



**Table H - tlkpTitles**

Title	Value
Units	FEET
BndryNm	Williams River
Model Year	2001

Table H contains values used by the model to determine the units of measure of the imported data, the name of the project area, and the model year that road age is calculated from. Never edit the values in the “Title” field or change the units of measure. The Value for Model Year can be changed to any year.

**Table I – tlkpUse**

Road Use	Traffic Factor
HEAVY	120
LIGHT	2
MODERATE	10
MODERATELY HEAVY	50
NONE	0.1
OCCASIONAL	1

Table I contains legal values for the Road Use Type in the aaaSedmodl table and the associated factors used by the model. Do not edit the “Road Use” field. You can edit the Traffic Factors.

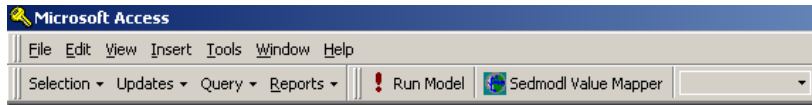
Never edit or delete these look-up tables:

- tsysQueries
- zstItemValues
- zstlogErr
- zstSumSed

These tables are used internally by the application.

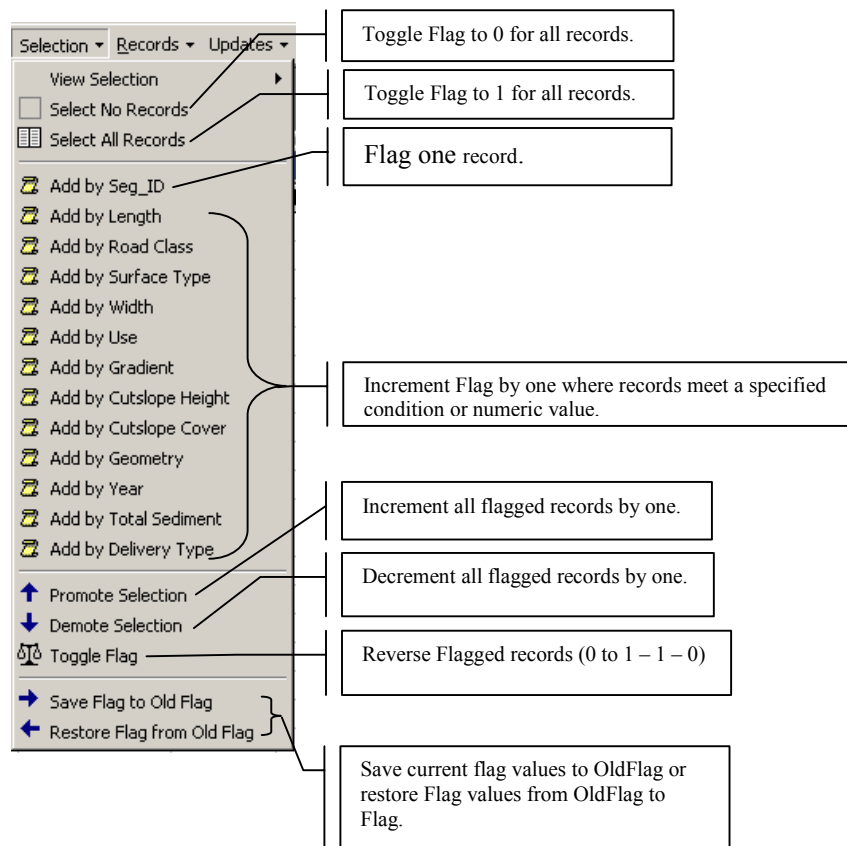
## Custom Menus

A custom menu is available to assist the user with interacting with the application. Each menu exposes a range of choices to the user. Simply click on a menu choice to view the options. The File, Edit, Database, and Records menu choices offer standard Windows and Access menu choices. The Selection, Updates, Query and Reports menu choices offer a wide range of actions for interacting with the data. There is also a toolbar with three controls. The “Run Model” tool recalculates tread, cutslope, and total sediment; the “SEDMODL2 Value Mapper” tool launches the MapObjects based GIS component; and the “Go To Field” tool to jump to a specific field when a table is open.



## Flag Property

Microsoft Access provides powerful Query By Example capabilities that return information about the data stored in tables. This feature is available to users familiar with this technique and those willing to learn. Recognizing that some users may want to immediately take advantage of this Access application, tools have been added to help the user isolate attributes available in the aaaSedmodl table. These tools utilize a simple yet powerful function that increments the value of the Flag field by one each time specified conditions is met. To specify the condition to be met the user selects choices from the “Selection” menu choice.



This functionality can be demonstrated by the following example:

**Example:**

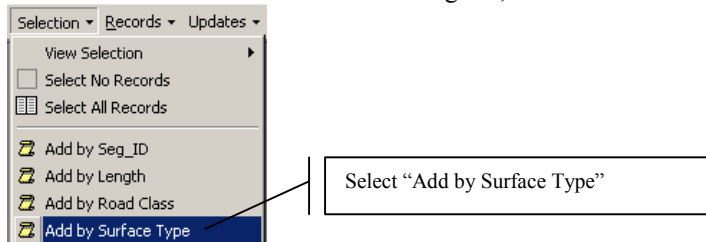
Suppose you want to isolate records where:

- the surface type is Pit Run
- the level of use is Moderate and,
- total sediment production is greater than or equal to 10.

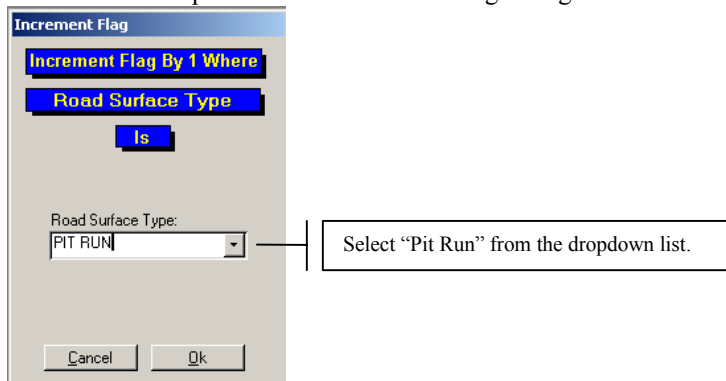
We can do this in three steps:

**Step 1.**

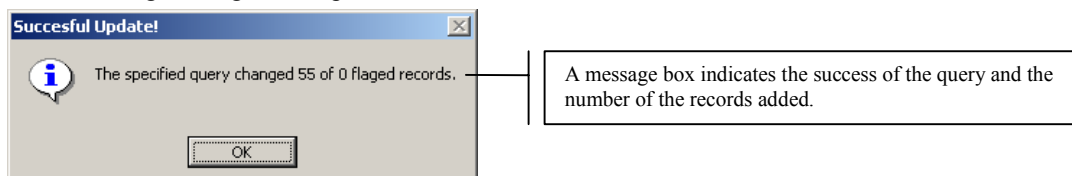
1. First select “Select No Records to set Flag = 0, then:



2. You will then be presented with the following dialog box.

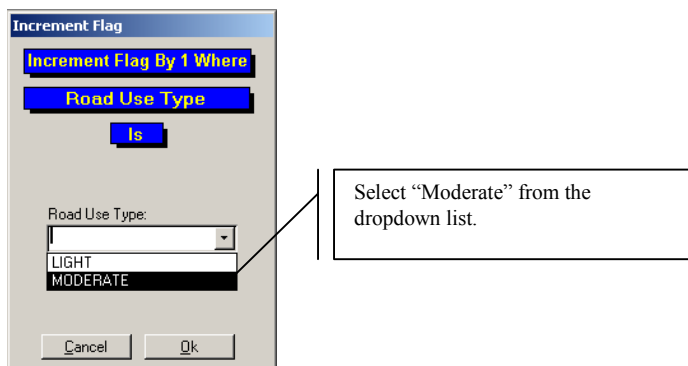


3. The following message box is presented.

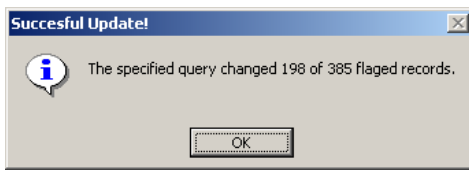


**Step 2**

1. Select “Add by Use Type” from the “Selection” menu. You will be presented with the following dialog:

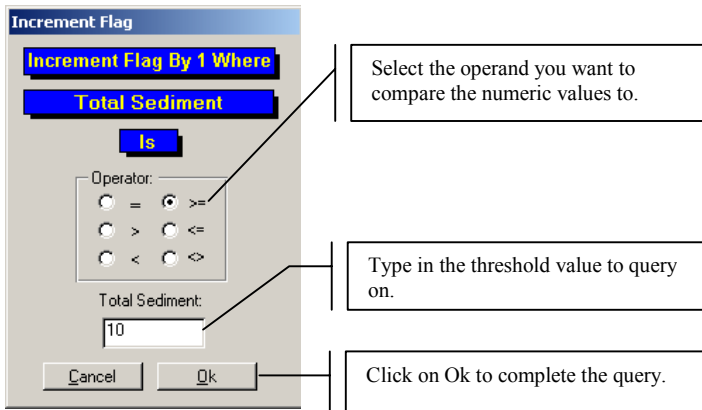


2. The query yields the following result.



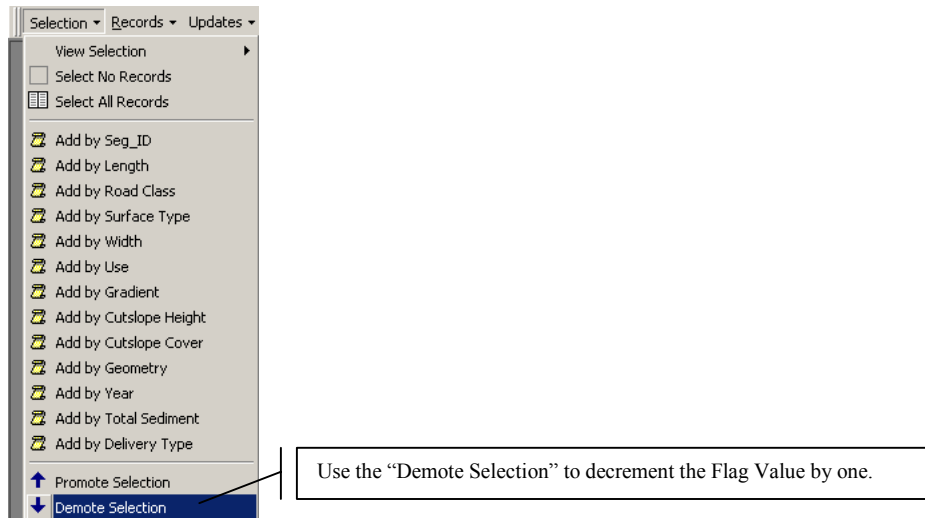
### Step 3

1. After selecting "Add By Total Sediment" from the menu you will be presented with the following dialog box:

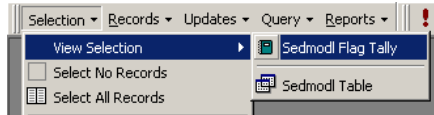


2. A message box will confirm the results of the query.

At this point you may have records with different Flag values, each representing whether it met one or more query criteria. If three queries were made then some records may have a Flag value of 3, while some records that only met one query criteria may have a value of 1. If after each query you want to only include records that met both query criteria you can use the "Demote Selection" menu choice.



If you want to view the contributing sediment of Flagged records you can select the SEDMODL2 Flag Tally menu choice from the “Selection”, “View Selection” menu choice.



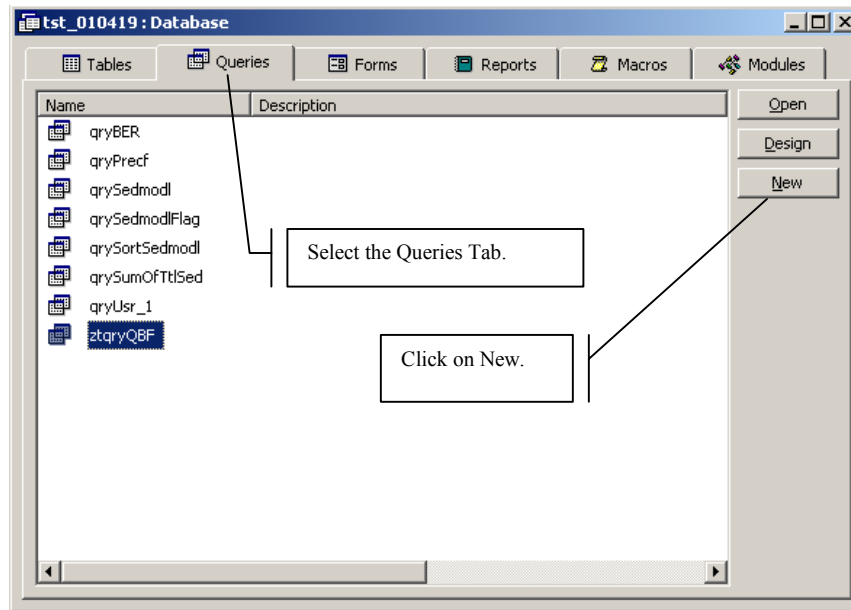
An example of this menu action is:

qrySedmodlFlag : Select Query					
Flag	Tally	Total Tread Sed	Total Cutslope Sed	Total Sed	
-1	189	15.9477799525703	4.56244875804259	20.5102287281989	
0	194	61.1453082165681	4.26954019930236	65.4148477834824	
1	2	27.3044118881226	0.743744134902954	28.0481557846069	

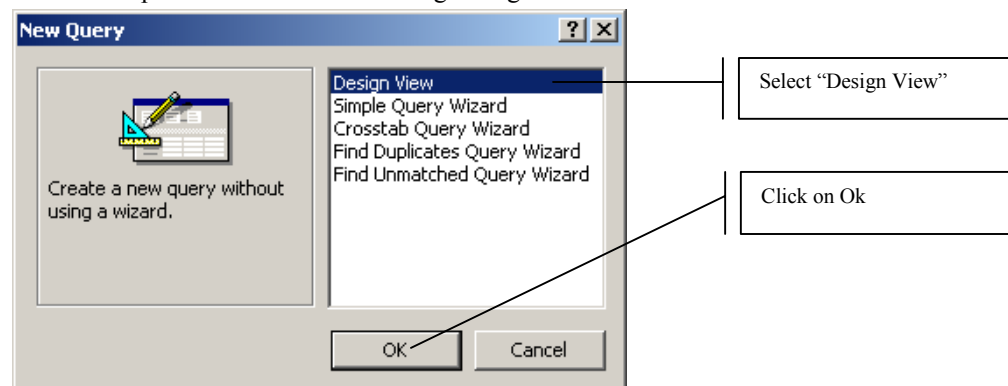
Record: 1 of 3

Negative Flag values indicate that the “Demote Selection” menu action has been used. A separate record will be presented for each flag value. The Tally field shows the number of records for each Flag value. The total sediment is for each Flag value.

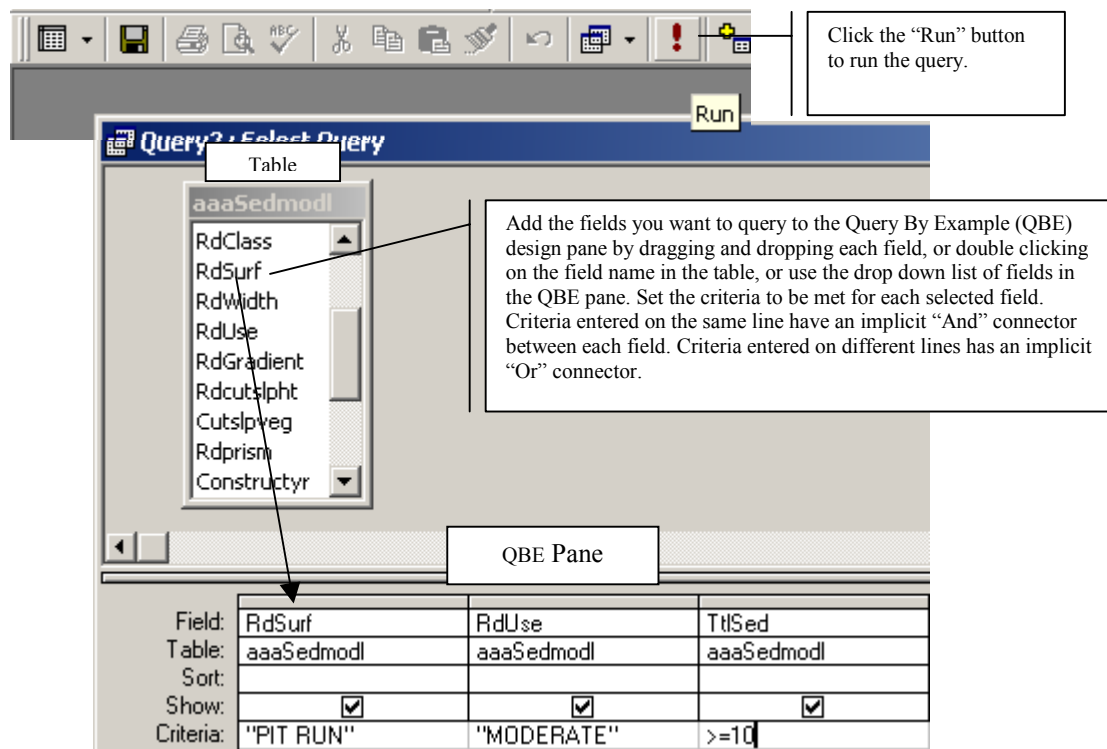
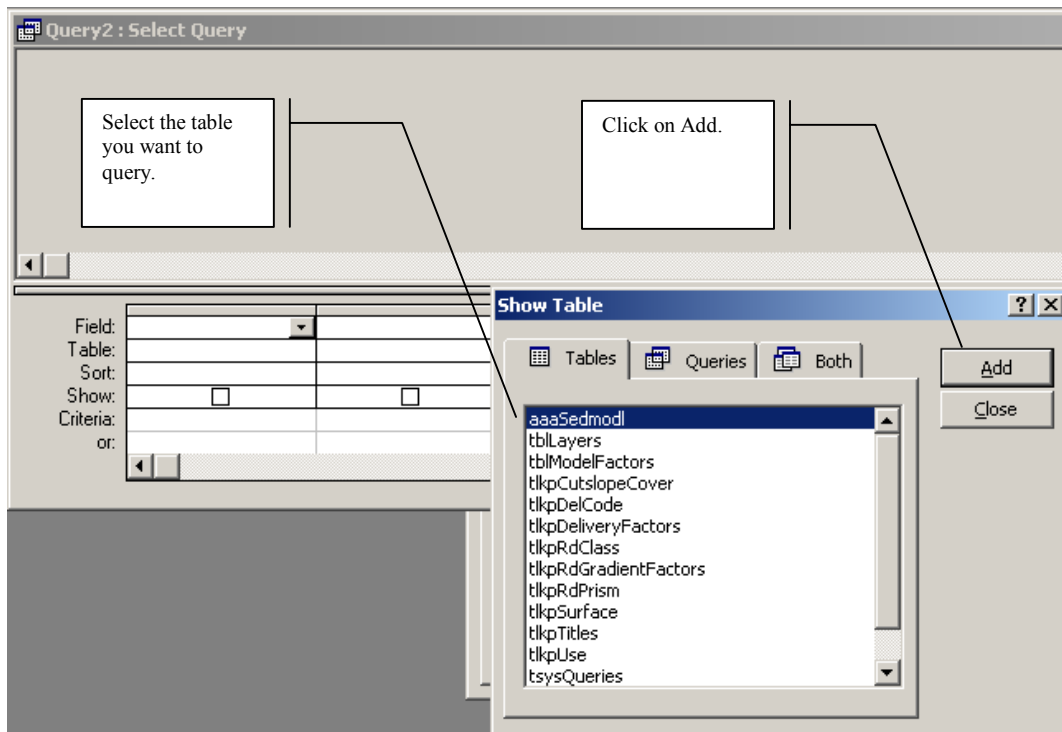
An example of using the Access “Query By Example” (QBE) functionality for isolating records is represented by the following.



You will be presented with the following dialog box:



The following dialog box is presented to you:

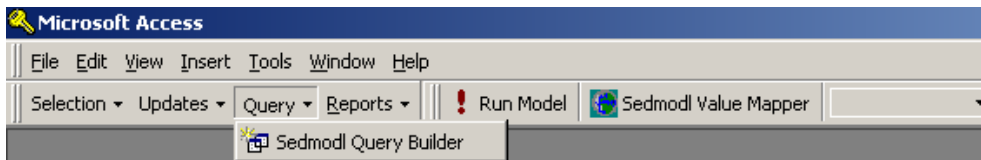


If records are available that meet the criteria then a data sheet view of the selected records will be presented.

Query2 : Select Query		
Surface Type	Road Use	Total Sed
PIT RUN	MODERATE	17.43

If you want to change the query you can either click on the Design button on the Query Datasheet Toolbar or right click on the frame of the Query Datasheet and select Query Design.

Another way to query records is to use the SEDMODL2 Query Builder, which is listed as a menu choice under the Query Menu.



This menu choice presents the following dialog box.

**Sedmodl Query Builder**

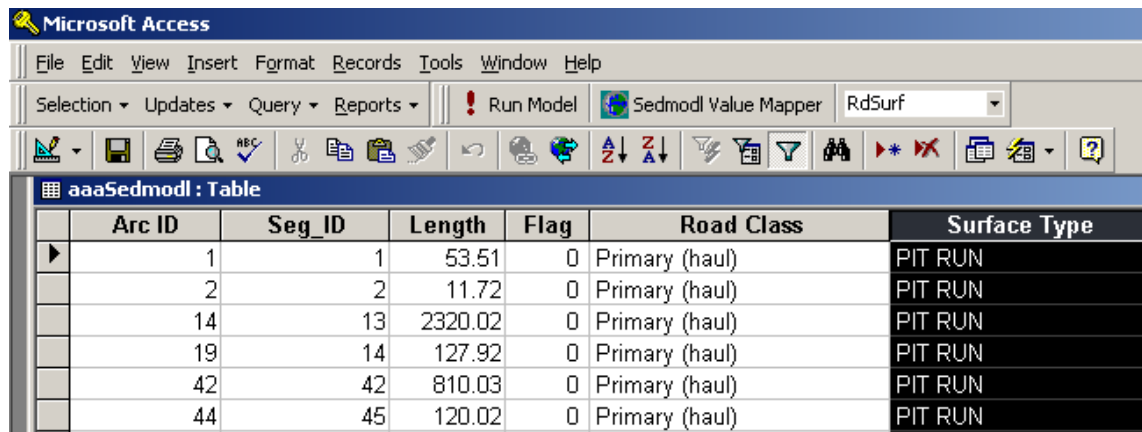
Category: Sedmodl (Sorted by ID) Connector: AND

Field	Comparison	Value
RdSurf	=	'Pit Run'
TtlSed	>=	10

Run View SQL Reset Save Close

The SEDMODL2 Query Builder allows you to select up to five fields from the aaaSedmodl table using one of several operands; user specified values; and an explicit “And” or “Or” connector between each field. Once a query is constructed you can either Run the query or View the SQL (pronounced sequel) statement that you constructed. You can also save the query to be run again. If you save the query it will be available as a choice in the “Category” drop down list. Text Values must be enclosed in either single or double quotes. The query is not case sensitive but is spelling sensitive. If you get a message box indicating that no records meet you criteria then check you spelling, or open the table and check the values of the specified field.

If the query successfully produces records, you may want to change the value of the Flag field for those records. To do this you can take advantage of the Replace menu choice available under the Edit menu. With the SEDMODL2 Query Builder datasheet open or with the aaaSedmodl table open you can highlight the column of a field by clicking on the field name. In this example, the Surface Type field has been

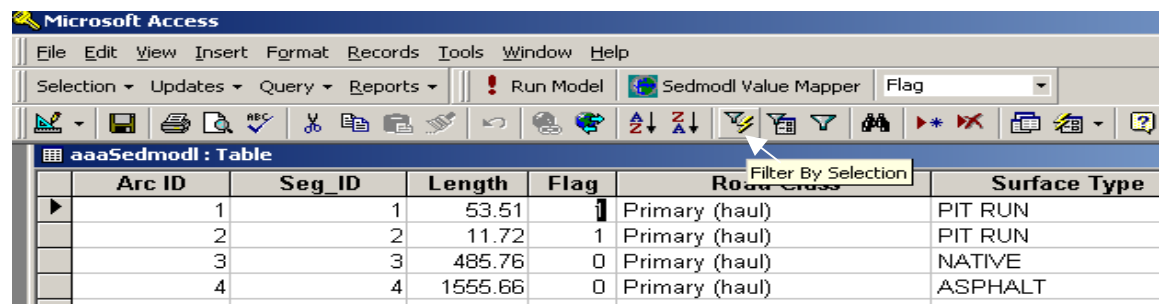


The screenshot shows the Microsoft Access interface with the 'aaaSedmodl : Table' datasheet open. The 'Surface Type' column is highlighted. The table contains the following data:

Arc ID	Seg_ID	Length	Flag	Road Class	Surface Type
1	1	53.51	0	Primary (haul)	PIT RUN
2	2	11.72	0	Primary (haul)	PIT RUN
14	13	2320.02	0	Primary (haul)	PIT RUN
19	14	127.92	0	Primary (haul)	PIT RUN
42	42	810.03	0	Primary (haul)	PIT RUN
44	45	120.02	0	Primary (haul)	PIT RUN

selected.

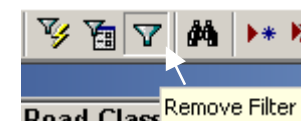
The Replace action will replace all occurrences of the specified values unless you have filtered the selection to a subset of the total number of records. You can take advantage of the Flag field to do this. Suppose you have selected a subset of records using the “Add to Flag” Selection menu or the SEDMODL2 Query Builder and the subject records have the Flag value set to 1. Place the cursor in one of the Flag fields with a value of 1. And click on the “Filter By Selection” button. You’ll notice that only the records with a Flag value of one are available for viewing. Now, a Replace action will only affect these filtered records.



The screenshot shows the Microsoft Access interface with the 'aaaSedmodl : Table' datasheet open. The 'Flag' column is filtered to show only records where Flag = 1. The 'Filter By Selection' button is highlighted. The table contains the following data:

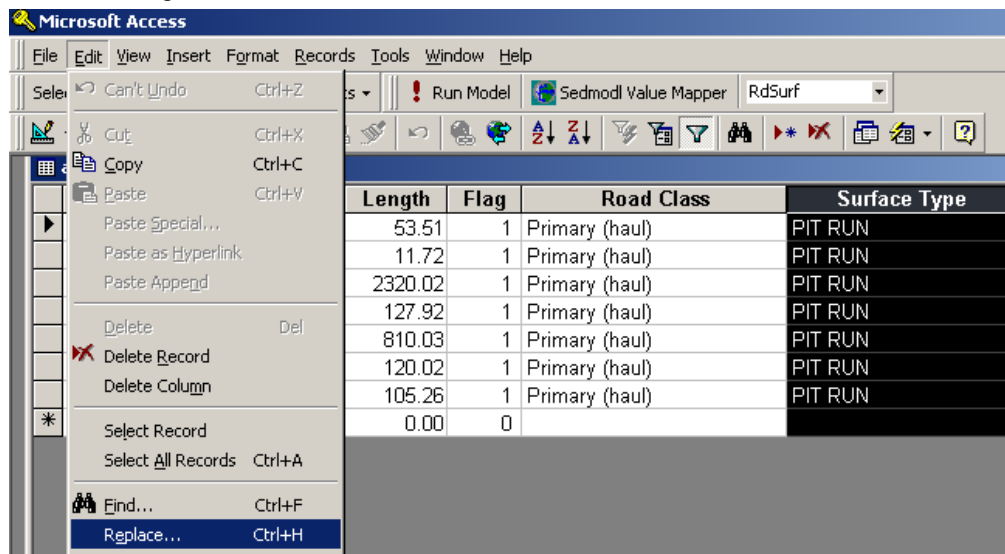
Arc ID	Seg_ID	Length	Flag	Road Class	Surface Type
1	1	53.51	1	Primary (haul)	PIT RUN
2	2	11.72	1	Primary (haul)	PIT RUN
3	3	485.76	0	Primary (haul)	NATIVE
4	4	1555.66	0	Primary (haul)	ASPHALT

You’ll also notice that the Filter button is depressed. To remove a filter simply click on this button again.

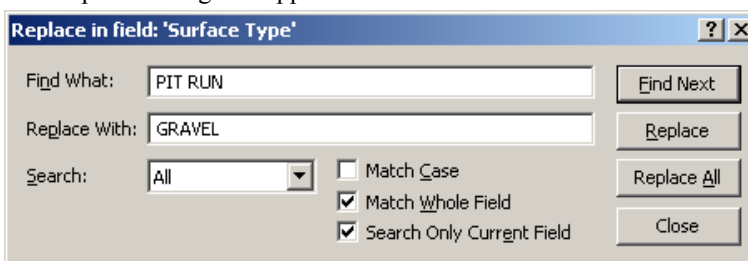




Now we can replace the selected field.

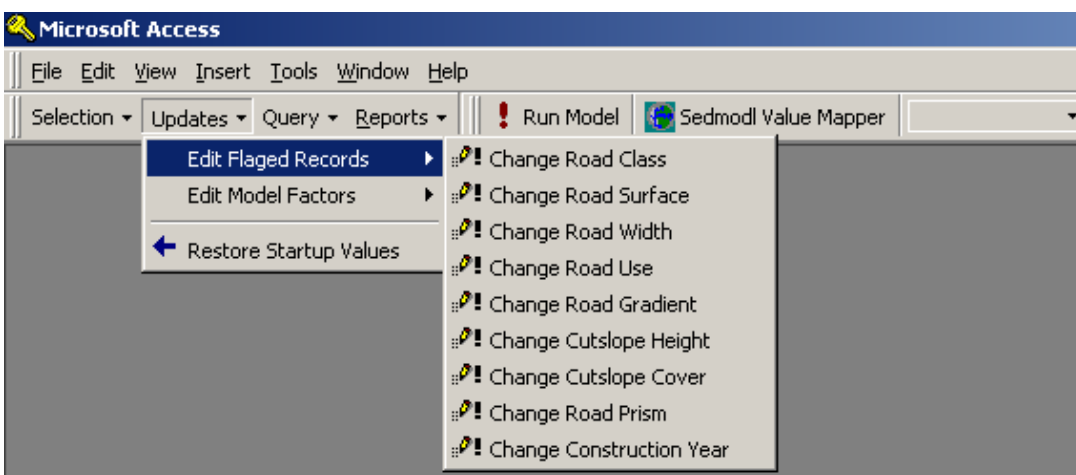


The Replace dialog box appears.

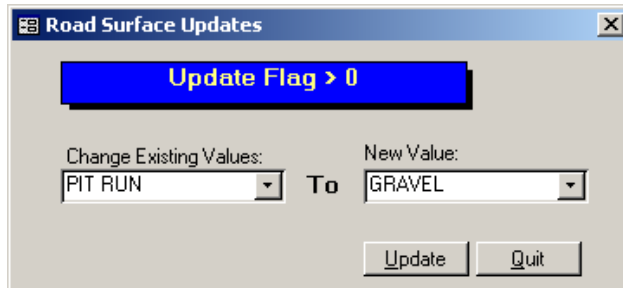


After clicking “Replace All” you’ll be prompted to verify the action. This is action is not reversible, so be careful.

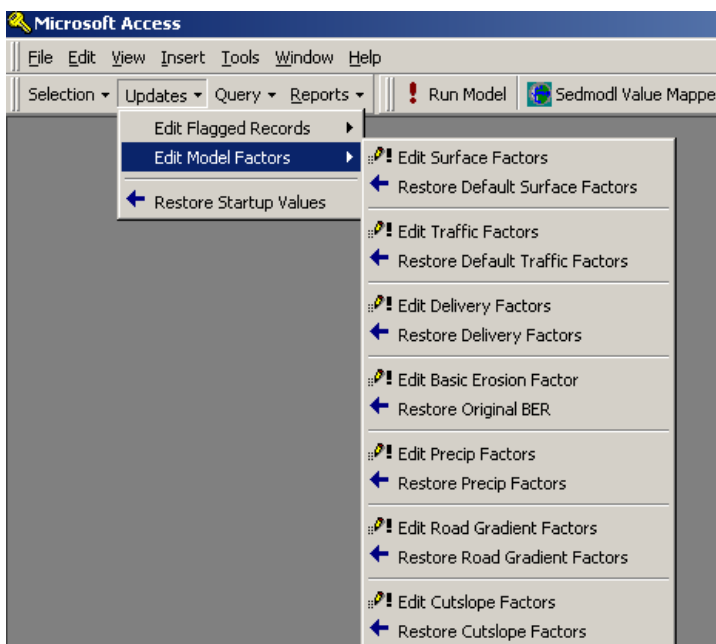
Another approach to replacing values where Flag is greater than 0 is to use one of the “Change...” menu choices located under the “Edit Flagged Records” menu selection.



These selections present the user with a dialog box that can be used to change existing values to a new value where “Flag” is greater than 0. For example, if you want to change ‘Pit Run’ surfacing to ‘Gravel’ where “Flag” is greater than 0 you would use this dialog box to update existing records to the new value.



Another edit function a user may want to utilize is the ability to alter the default coefficients used by the model. The Access application exposes the following model coefficients to the user for editing.

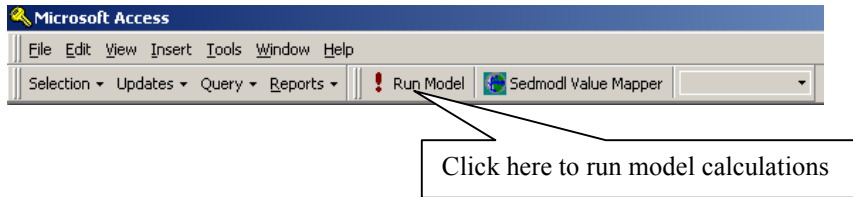


An example would be editing the Road Surface Factors, which can be edited using the following dialog box.

Edit Surface Factors	
Surface Type	Surface Factor
ASPHALT	0.03
GRASSED NATIVE	0.50
GRAVEL	0.20
GRAVEL WITH RUTS	0.40
NATIVE	1.00
NATIVE WITH RUTS	2.00
PIT RUN	0.49

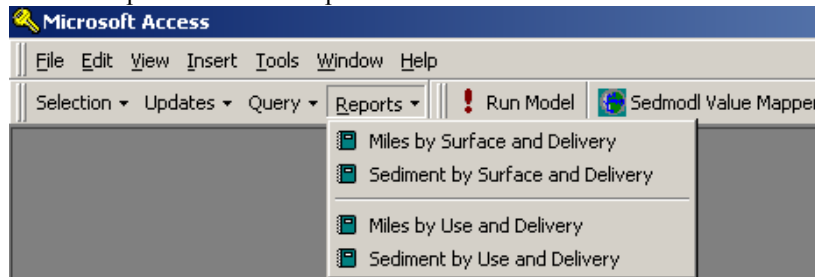
Each of the Edit dialogs can be restored to the default values by selecting the Restore action from the same menu.

Once the user has completed edits they can process these changes through the model by clicking on the “Run Model” toolbar menu choice.



All records are processed through the model.

The results of the model run can viewed directly in the aaaSedmodl table or by selecting one of four standard reports from the “Reports” menu.



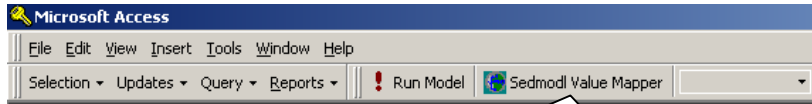
For example, the “Miles by Surface and Delivery” menu choice produces the following report.

#### **Miles of Road by Delivery Type and Surfacing**

Surface Type	Total Miles	Delivery Type		
		Direct Delivery	Indirect (100ft)	Indirect (200ft)
ASPHALT	0.6	0.3	0.2	0.1
GRAVEL	38.2	5.9	7.0	7.4
NATIVE SURFACE	380.3	48.1	40.9	66.8

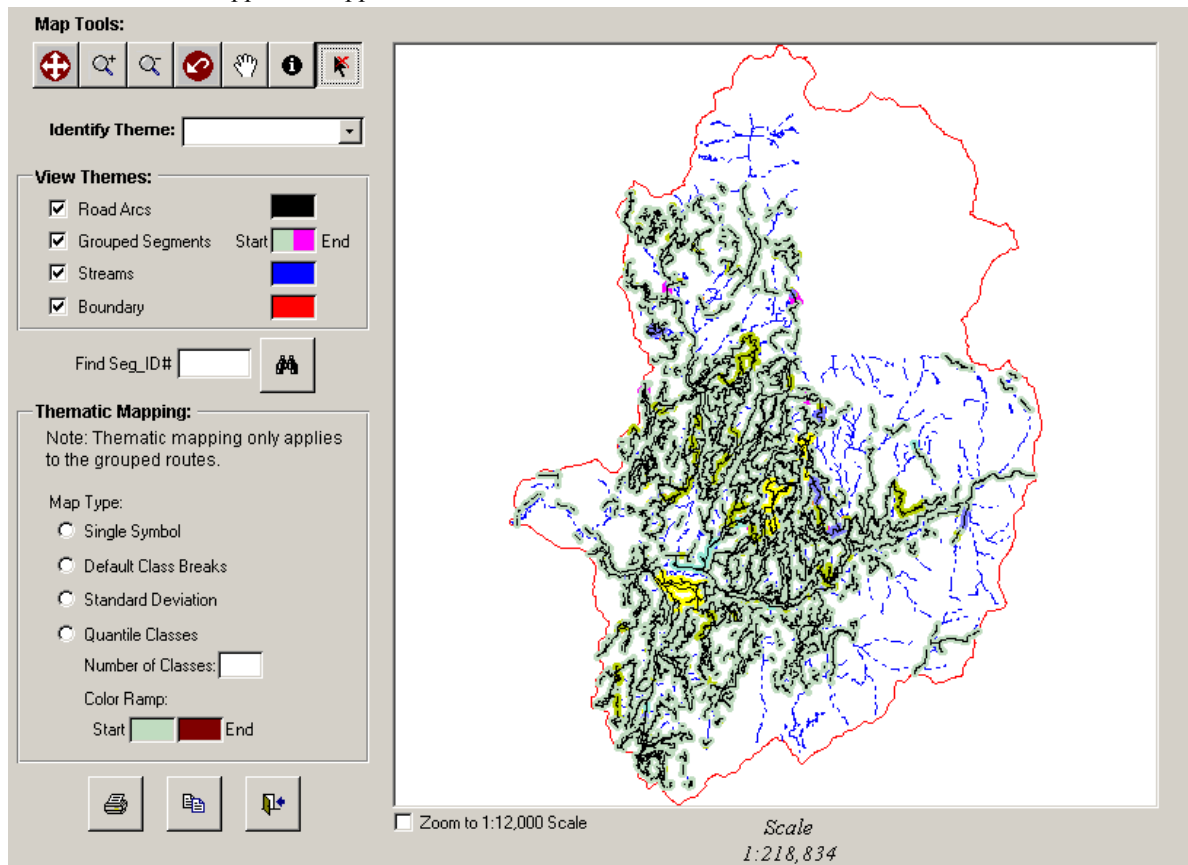
## SEDMODL2 Mapper

The SEDMODL2 what-if scenario modeler has been extended to include Geographic Information System (GIS) capabilities. These capabilities are limited to viewing and querying the some of the GIS data used by the ArcInfo during the spatial analysis performed by SEDMODL2. The functionality provided by this GIS component is described below by utilizing graphic representations of the graphic user interface (GUI).

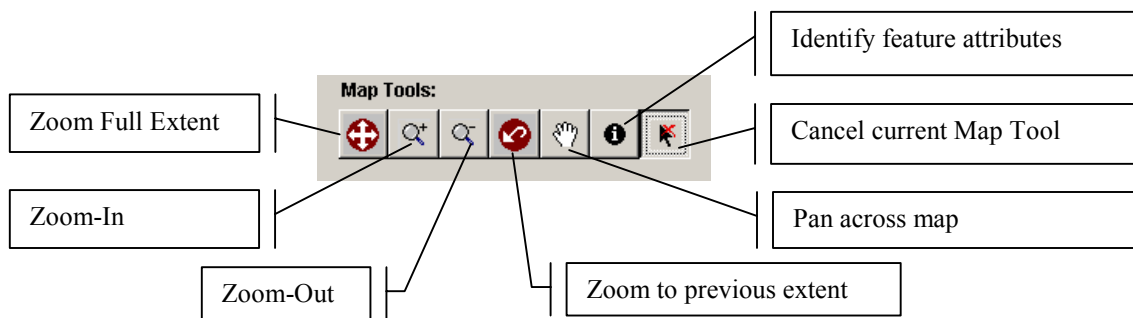


Click here to run SEDMODL2 Value Mapper

The SEDMODL2 Mapper will appear.

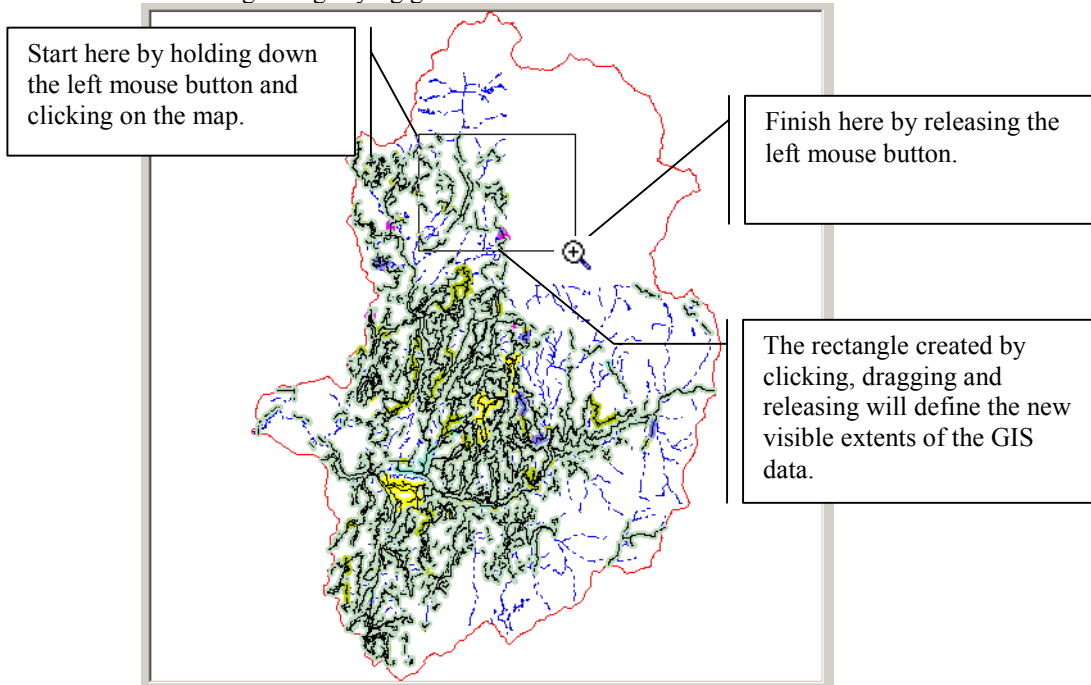


The Map Tools toolbar assists the user by zooming in and out, zoom to full extent, zoom to previous extent, panning, and identifying feature attributes.



Full Extent – Zooms to the full extent of the project area boundary

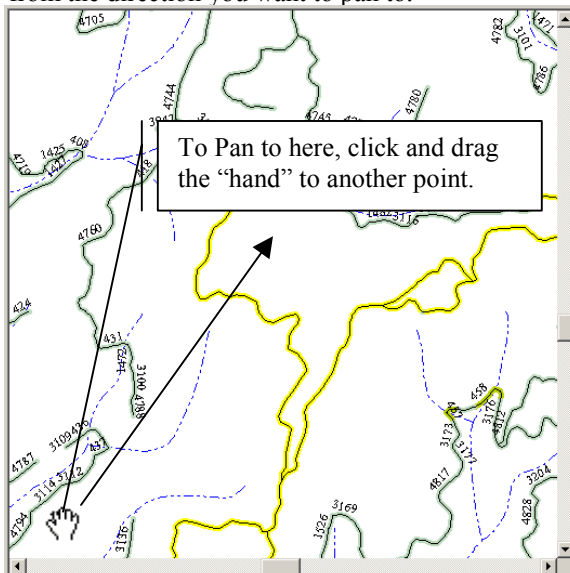
Zoom-In – the user can zoom-in to an area defined by a rectangle drawn on the map window by holding down the left mouse button while clicking on map window and dragging the mouse towards the opposite direction of the area you want to zoom into. The mouse cursor will change shape to resembling a magnifying glass with a “+” in the middle.



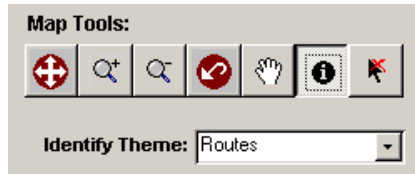
Zoom-Out – The Zoom-Out toolbar choice will allow the user to zoom-out by clicking anywhere on the map window. The mouse cursor will change shape to resembling a magnifying glass with a “-” in the middle.

Zoom Previous – The Zoom Previous toolbar choice allows the user to zoom to the last view extents created by the user prior to the current extent.

Pan – The Pan toolbar choice allows the user to pan across the map window. The cursor will change shape to resemble a hand. The Pan action is accomplished by left clicking on the map and dragging away from the direction you want to pan to.

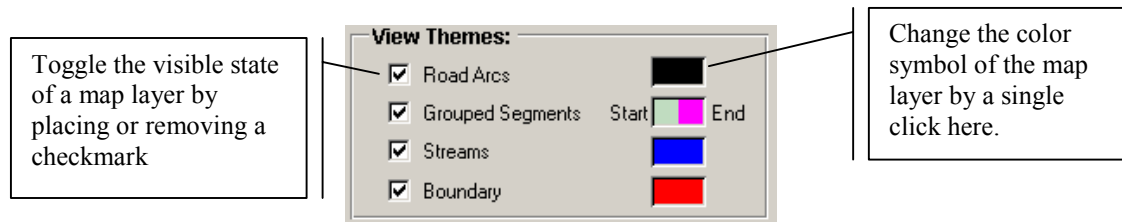


**Identify** – The Identify toolbar choice allows the user to select one of the available map layers and query the attributes of a feature on the selected map layer. This is accomplished by selecting a map layer from the “Identify Theme” dropdown list. Simply click on the down arrow on the drop down list to expose the available map layers to query. Next, click on the Identify Map Tool button. When the mouse cursor is placed over the map window the shape of the cursor will change from an arrow to an arrow with the black circle with a letter “i” in the middle. When a feature on the currently selected layer is selected by clicking on that feature, a popup list of the attributes of that feature is presented to the user.

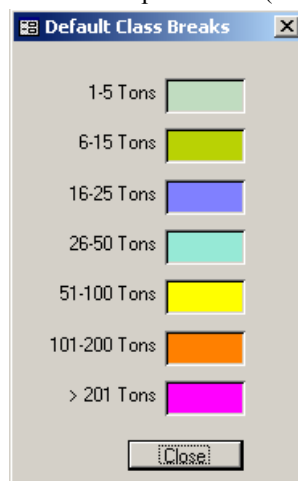


**Cancel** – The Cancel toolbar choice restores the mouse cursor shape to the default cursor shape.

The View Themes section of SEDMODL2 Mapper allows the user to change the visible state of each map layer in the map window. This section also allows you to change the color symbol for each of the map layers except the grouped segments routes layer. The symbology for this map layer is predetermined and not available to the user to alter. To change the visible state of a map layer, simply place or remove a check from the checkbox to the left of the map layer name. To change the color symbol of a map layer or to view the symbology used to render the grouped segments routes layer, simply single click on the colored box to the right of each map layer name.

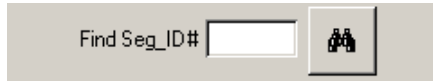


The Grouped Segments layer was created in ArcInfo to improve the ability to represent the range of sediment production from road segments. SEDMODL2 utilizes several GIS processes that result in splitting road arcs into many smaller pieces. However sediment production and delivery of sediment is best represented by the additive affect of sediment along a road segment sharing a common delivery type (direct or indirect) and a common surface type. To accomplish this, SEDMODL2 utilizes dynamic segmentation and creates a route system based on surface type and delivery type. Contiguous segments sharing these two attributes are grouped into one segment and the total sediment of these grouped arcs is summed onto the route section. The average annual sediment production (tons) is classed and symbolized as follows:



To access the “Default Class Breaks” form simply single click on the colored box to the right of the Grouped Segments map layer.

The aaaSedmodl table has two fields named Arc\_ID and Seg\_ID. As previously mentioned, SEDMODL2 breaks the road coverage arcs into many pieces. Each record in the aaaSedmodl table represents these many parts and Arc\_ID represents the unique identifier for each arc (record). The Seg\_ID is not unique because this Id number relates to the grouped segments on the route. In other words, there may be 10 records in aaaSedmodl representing ten contiguous arcs used to create one section on the route. In this case, ten records in aaaSedmodl will share a common Seg\_ID number. When reviewing the tabular data you may want to locate where a specific Seg\_ID exists in the GIS data. To help the user locate a Seg\_ID the following tool is available.

A small rectangular tool interface with a light gray background. It contains the text "Find Seg\_ID#" followed by a white text input box. To the right of the input box is a button with a black icon of binoculars.

Simply type in the Seg\_ID you want to locate and then click on the Find button that is represented by binoculars. If the indicated Seg\_ID exists then SEDMODL2 Mapper will zoom to the extents of the feature and the feature will be flashed four times.

When the map scale is equal to or less than 1:12,000 the Seg\_ID numbers will appear (if the Grouped Segments layer is visible).

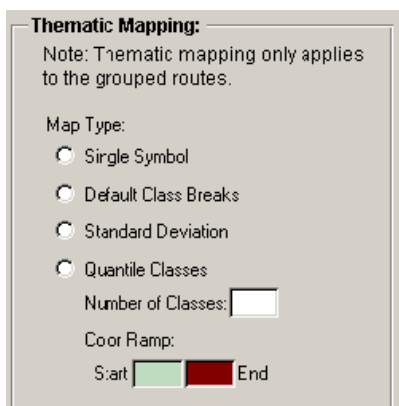
The order the map layers are drawn from top to bottom is:

- Road Arcs
- Grouped Segments
- Streams
- Watershed (project) Boundary

The Road Arcs are drawn on top of the Grouped Segments in case the user wants to identify the attributes of the arcs that make up a route section.

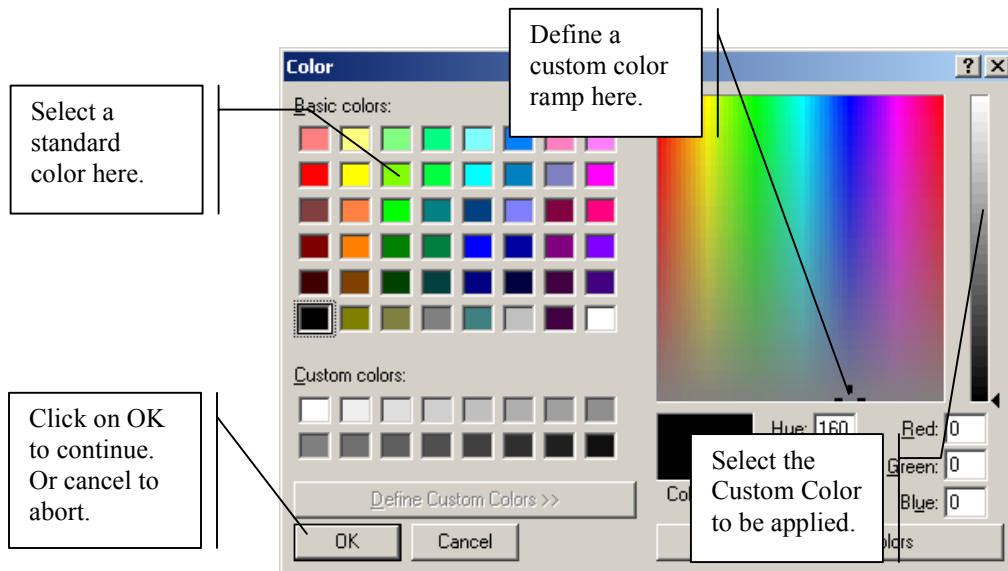
Three additional ways of symbolizing the Grouped Segments is provided.

- Single Symbol
- Standard Deviation of Total Sediment
- User identified Quantile Class Breaks

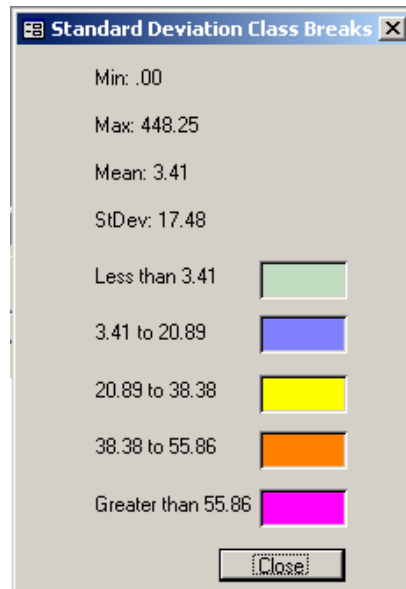
A dialog box titled "Thematic Mapping:" with a light gray background. Below the title is a note: "Note: Thematic mapping only applies to the grouped routes." Under "Map Type:", there are four radio button options: "Single Symbol", "Default Class Breaks", "Standard Deviation", and "Quantile Classes". Below these is a text input field labeled "Number of Classes:". Under "Color Ramp:", there is a color selection area with a "Start" label, a green color swatch, an "End" label, and a red color swatch.

The “Default Class Breaks” radio button renders the Grouped Segments using the default class breaks previously described.

Selecting “Single Value” will present the Color Dialog which allows the user to select a color that will be used to render the Grouped Segments map layer.



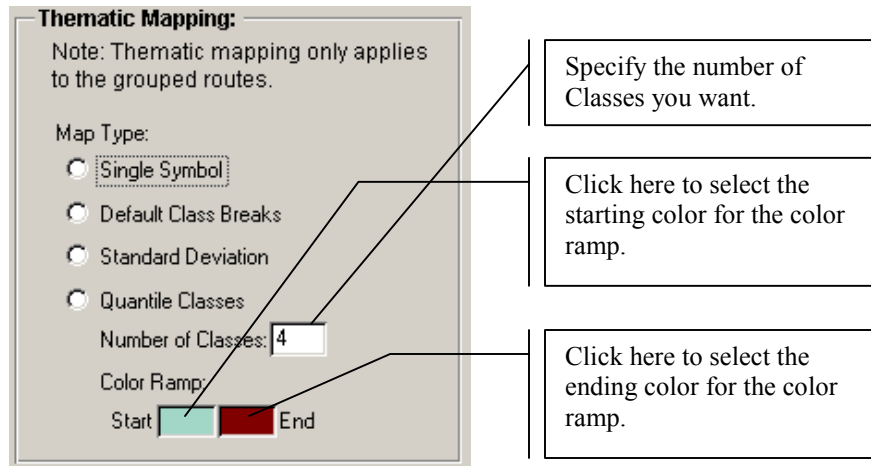
The Standard Deviation radio button choice renders the Grouped Segments map layer with Class breaks based around standard deviation of the total sediment. Five class breaks are created and are reported by the following form:



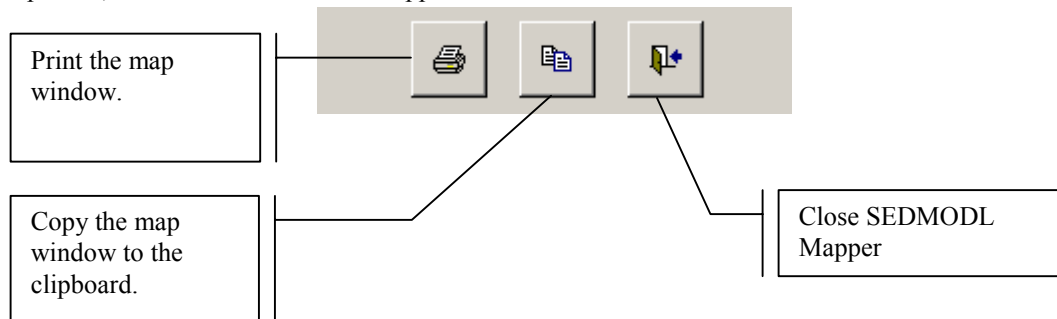
The symbology for the class breaks is not editable by the user.



The Quantile Classes radio button choice provides the user with the ability to specify the number of class breaks to be rendered and to specify the starting and ending colors to be applied by a color ramp.



Three additional buttons exist near the bottom left portion of SEDMODL2 Mapper. These buttons allow the user to print the visible extents of the map window, copy the visible extents of the map window to the clipboard, and close SEDMODL2 Mapper.



If the user has

- altered the starting data
- is satisfied with the results, and
- wants to join the results of the “What-If Scenario Modeler” back onto the SEDMODL2 output ArcInfo coverage.

They can select the “Save As/Export” menu choice available under the File menu. Select an output file type of dBASE IV and save the file to the ArcInfo workspace created by SEDMODL2. The ArcInfo command:

```
Arc: dbaseinfo
```

```
Usage: DBASEINFO <dbase_file> <info_file> {DEFAULT | DEFINE}
```

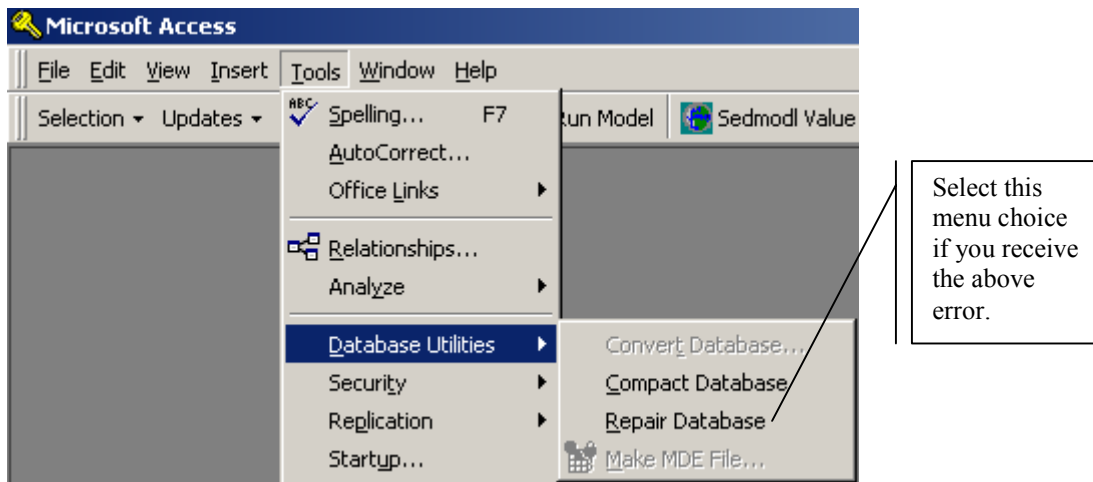
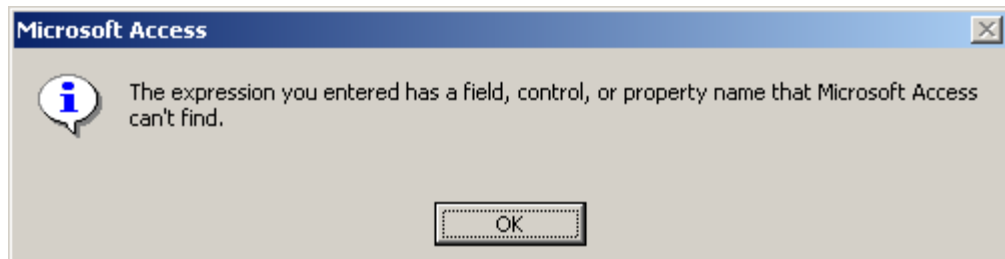
will translate the dBASE file format into an ArcInfo INFO file. Make a copy of the output coverage and drop all but the standard ArcInfo items. Use the

```
Arc: joinitem
```

```
Usage: JOINITEM <in_info_file> <join_info_file> <out_info_file>  
<relate_item>{start_item} {LINEAR | ORDERED | LINK}
```

command to join the dBASE file onto the coverage. It will be necessary to alter the Arc\_ID field name to be consistent with the coverage user-id name.

If you receive the following error message you can usually solve the problem by selecting the Repair Database choice from the Tools/Database Utilities menu.



This application uses information stored in the tblLayers table to determine the location of the ArcInfo coverage used in the SEDMODL2 Mapper GIS component. You move the location of the ArcInfo model run output coverages you will need to update the tblLayers table to reflect the current location of the GIS data.

The tblLayers table will appear as:

tblLayers : Table			
	Title	Name	Path
▶	Boundary	TSTbndry.pat	[ARC]c:\sedmod\TST_010524\outcovs\TSTbndry.pat
	Hydro	TSThydro.aat	[ARC]c:\sedmod\TST_010524\outcovs\TSThydro.aat
	Arcs	TST_RDSED.aat	[ARC]c:\sedmod\TST_010524\outcovs\TST_RDSED.aat
	Routes	TSTsegs	c:\sedmod\TST_010524\shapefiles\TSTsegs
*			

The Title fields should never be edited.

Only edit these fields if you change the coverage name or the name of the route shapefile.

Change the path of the coverages and shapefile if their location and/or name change.