

The GRAIP Preprocessor

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GRAIP Tutorial pages 12-22

GRAIP Process

- Road Inventory (In the field)
- Data preparation
 - Data transfer
 - Differential correction
 - **GRAIP Preprocessor**
- Stream network delineation (TauDEM)
- Stream crossing filtering
- GRAIP Analysis
 - Road Erosion, Drain Point Accumulation and Stream Sediment Inputs
 - Terrain stability analysis
 - Drain point erosion sensitivity
 - Fish habitat segmentation

Preprocessor Purposes

- Screen Road Inventory for Data Entry Errors
 - Resolve undefined/mismatching field values
 - Log orphan roads and drain points
- Import Road Inventory into Integrated GRAIP Database
 - Combine multiple drain point and road shape files
 - Match input shape file fields to GRAIP database fields
 - Assign unique road and drain point identifiers

Input Shapefiles

The screenshot displays a GIS application window with a map showing a network of roads and drainage features. On the left, a legend lists several layers: BBdp, Diffuse, DitchRel, LeadOff, Ned, Str_Xing, Sump, WaterBar, Road, and dem. The 'Road' layer is currently selected. Three attribute tables are overlaid on the map:

Attributes of BBdp

| FID | Shape | SLOPE_SHAP | STREAM_CON | OBSTRUCT | FILL_EROS | TYPE | CONDIT | MATERIAL | COMM |
|-----|-------|------------|------------|----------|-----------|----------------|------------|-------------|-----------------------|
| 0 | Point | Planar | No | Abundant | No | Flat Ditch | No problem | Native Soil | You broad based dip |
| 1 | Point | Planar | No | Moderate | Yes | Grade Reversal | No problem | Native Soil | Problem: rutted |
| 2 | Point | Planar | No | None | Yes | | No problem | Native Soil | Problem: rutted |
| 3 | Point | Planar | No | Moderate | No | Grade Reversal | No problem | Native Soil | outlet to other water |

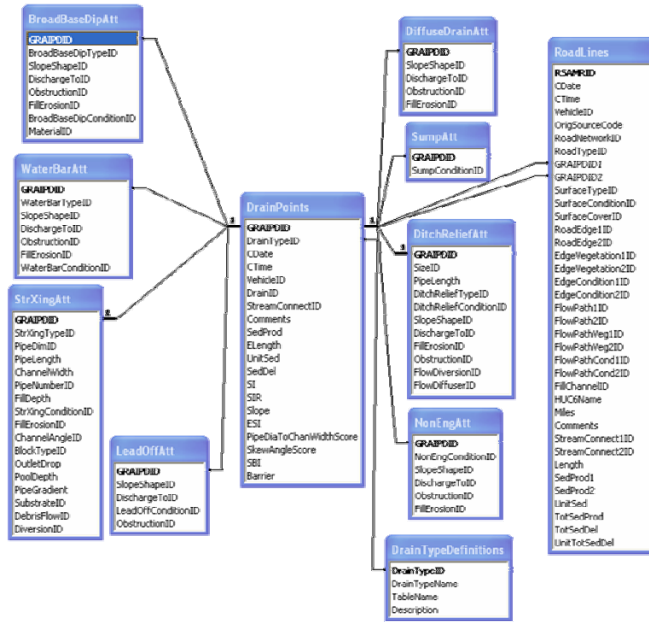
Attributes of WaterBar

| FID | Shape | SLOPE_SHAP | DISCHRG_TO | STREAM_CON | OBSTRUCT | FILL_EROS | TYPE | CONDIT |
|-----|-------|------------|--------------|------------|----------|-----------|---------------|------------|
| 0 | Point | Planar | Forest Floor | Unknown | None | No | Road Material | No Problem |
| 1 | Point | Planar | Forest Floor | Unknown | None | Yes | Road Material | No Problem |
| 2 | Point | Planar | Forest Floor | No | None | No | Road Material | No Problem |
| 3 | Point | Planar | Forest Floor | No | None | No | Road Material | No Problem |
| 4 | Point | Planar | Forest Floor | No | Moderate | No | Road Material | No Problem |

Attributes of Road

| FID | Shape | SURF_TYPE | SURF_COND | ROAD_TYPE | RD_EDGE_1 | RD_EDGE_2 | EDGE_VEG_1 | EDGE_VEG_2 | EDG_CND_1 |
|-----|----------|-----------|--------------|----------------|-----------|-----------|------------|------------|--------------|
| 0 | Polyline | Native | Good | System road | 0 - 6' | Fill | > 50 % | > 50 % | No problem |
| 1 | Polyline | Native | Good | System road | 6 - 10' | 6 - 10' | > 10 % | > 10 % | Badly rutted |
| 2 | Polyline | Native | illed/eroded | High clearance | 0 - 6' | Fill | > 50 % | > 75 % | No problem |
| 3 | Polyline | Native | illed/eroded | High clearance | 0 - 6' | Fill | > 50 % | > 50 % | No problem |
| 4 | Polyline | Native | Good | High clearance | 0 - 6' | Fill | > 0 % | > 25 % | Badly rutted |

GRAIP Database Schema



Screen 1 – File setup dialog

G File Setup

The GRAIP Preprocessor is a tool to import USDA Forest Service road inventory information into an MS Access database for use by the GRAIP analysis tools.

Project File
File you assign for GRAIP project C:\Dave\Scratch\demo\dm.graip ...

Input Files
 DEM File ("sta.adf" inside the DEM folder)
Digital Elevation Model for Study Area C:\Dave\Scratch\demo\DEM\dem ...

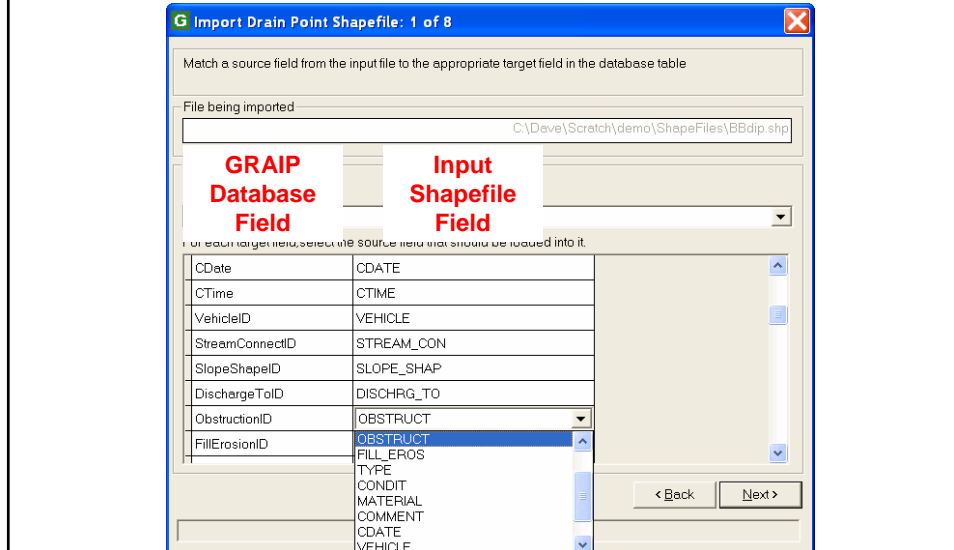
Road Shapefiles
 C:\Dave\Scratch\demo\ShapeFiles\Road.shp Add Del
Road shapefile (could be multiple)

Drain Points Shapefiles
 C:\Dave\Scratch\demo\ShapeFiles\BBdip.shp Add
 C:\Dave\Scratch\demo\ShapeFiles\Diffuse.shp Del
 C:\Dave\Scratch\demo\ShapeFiles\DitchRel.shp
 C:\Dave\Scratch\demo\ShapeFiles\LeadOff.shp
 C:\Dave\Scratch\demo\ShapeFiles\Ned.shp
 C:\Dave\Scratch\demo\ShapeFiles\Str_Xing.shp
 C:\Dave\Scratch\demo\ShapeFiles\Sump.shp
Drain point shapefiles

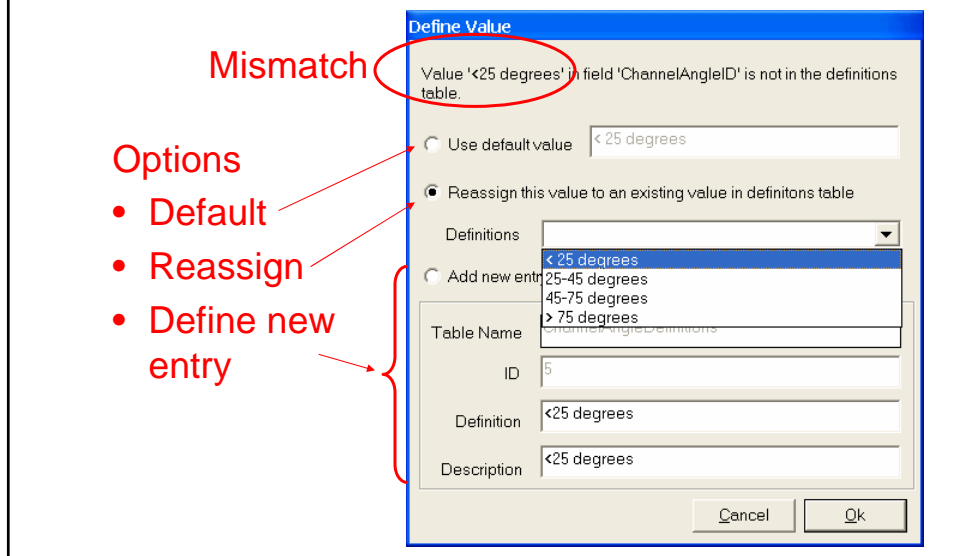
GRAIP Database (*.mdb)
Database file C:\Dave\Scratch\demo\dm.mdb ...

GRAIP Version 1.0.5 Options Cancel Next >

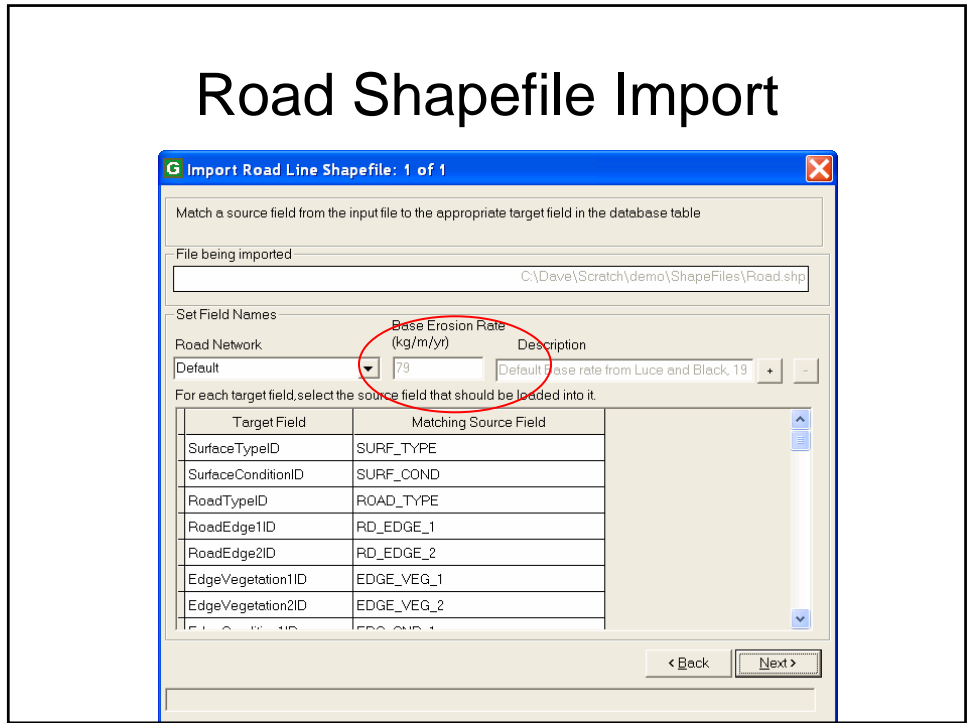
Matching shapefile columns to integrated database columns



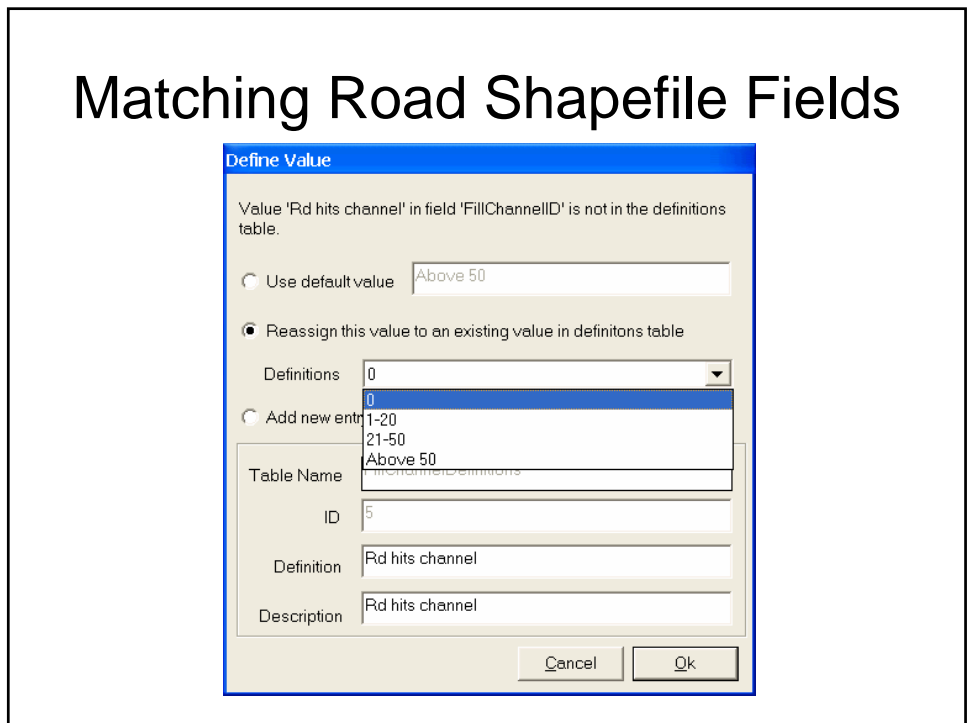
Field values must match GRAIP definitions tables



Road Shapefile Import



Matching Road Shapefile Fields



Filled GRAIP Database Tables

The screenshot displays several Microsoft Access tables with data and definitions. The tables shown are:

- BroadBaseDipAtt**: Contains columns GRAIPDID, BroadBaseDipTypeID, SlopeShapeID, DischargeToID, ObstructionID, FillErosionID, BroadBaseDipConditionID, and MaterialID. Data rows are visible with values like 1, 2, 3 in various columns.
- BroadBaseDipTypeDefinitions**: Contains columns BroadBaseDipTypeID, BroadBaseDipTypeName, and Description. Rows include Grade Reversal, Rat Ditch, and Constructed.
- SlopeShapeDefinitions**: Contains columns SlopeShapeID, SlopeShape, and Description. Rows include Concave, Planar, and Convex.
- DischargeToDefinitions**: Contains columns DischargeToID, DischargeTo, and Description. Rows include Forest Floor, Gully, Ditch, Landslide, Wetland, and Stream.
- MaterialDefinitions**: Contains columns MaterialID, MaterialName, and Description. Rows include Crushed, Native soil, Vegetated, Paved, and Cinder.
- ObstructionDefinitions**: Contains columns ObstructionID, Obstruction, and Description. Rows include None, Moderate, and Abundant.
- BroadBaseDipCondDefinitions**: Contains columns BroadBaseDipConditionID, Condition, and Description. Rows include No Problem, Puddles on road, Wetland in ditch, and Saturated fill.
- FillErosionDefinitions**: Contains columns FillErosionID, FillErosion, and Description. Rows include No and Yes.

Drain Point Import Errors

Access Database Table DPErrLog

| Index | GRAIPDID | DrainType | ErrorMessage | ActionTaken |
|-------|----------|-----------------|--|-----------------------------------|
| 1 | 612 | Stream Crossing | Value '<25 degrees' in field 'ChannelAngleID' is not in the definitions table. | Reassigned value as < 25 degrees |
| 2 | 620 | Stream Crossing | Value '<45 degrees' in field 'ChannelAngleID' is not in the definitions table. | Reassigned value as 25-45 degrees |
| 3 | 22 | Diffuse drain | Orphan Drain Point | Nothing |
| 4 | 23 | Diffuse drain | Orphan Drain Point | Nothing |
| 5 | 32 | Diffuse drain | Orphan Drain Point | Nothing |
| 6 | 42 | Diffuse drain | Orphan Drain Point | Nothing |
| 7 | 48 | Diffuse drain | Orphan Drain Point | Nothing |

Text logfile *DP.log

```

dmDP.log - Notepad
File Edit Format View Help
"GRAIP Project File:C:\Dave\Scratch\demo\dm.graip"
"GRAIP Database File:C:\Dave\Scratch\demo\dm.mdb"
"09-17-2007", "22:09:19"
"GRAIPDID", "Drain Type", "Error Message", "Action Taken"
612, "Stream Crossing", "Value '<25 degrees' in field 'ChannelAngleID' is not in the defin
620, "Stream Crossing", "Value '<45 degrees' in field 'ChannelAngleID' is not in the defin
22, "Diffuse drain", "Orphan Drain Point", "Nothing"
23, "Diffuse drain", "Orphan Drain Point", "Nothing"
32, "Diffuse drain", "Orphan Drain Point", "Nothing"
42, "Diffuse drain", "Orphan Drain Point", "Nothing"
48, "Diffuse drain", "Orphan Drain Point", "Nothing"
    
```

Examination of Orphan Drain Point

Attributes of DrainPoints

| DrainPoints.GRAIPID | DrainPoints.Drain | DrainPoints.CDate | DrainPoints.CTI | DrainPoints.VehicleID | DrainPoints.DrainID |
|---------------------|-------------------|-------------------|-----------------|-----------------------|---------------------|
| 17 | 2/7/16/2007 | 03:35:00pm | | 1 | 7071616351 <N |
| 18 | 2/7/16/2007 | 04:10:00pm | | 1 | 7071616201 <N |
| 19 | 2/7/16/2007 | 04:20:00pm | | 1 | 7071616201 <N |
| 20 | 2/7/16/2007 | 04:30:00pm | | 1 | 7071616301 <N |
| 21 | 2/7/16/2007 | 04:35:00pm | | 1 | 7071616351 <N |
| 22 | 2/7/16/2007 | 09:20:00am | | 1 | 7071609201 <N |
| 23 | 2/7/9/2007 | 12:20:00pm | | 1 | 7070912201 <N |
| 24 | 2/7/16/2007 | 11:20:00am | | 1 | 7071611201 <N |
| 25 | 2/7/16/2007 | 11:55:00am | | 1 | 7071611551 <N |

Identify

Identify from: <Top-most layer>

Location: 606,762.828 4,873,107.759 Unknown

| Field | Value |
|--------------------------|------------|
| RoadLines.FID | 99 |
| RoadLines.Shape | Polyline |
| RoadLines.GRAIPRID | 99 |
| RoadLines.GRAIPRID | 99 |
| RoadLines.CDate | 7/16/2007 |
| RoadLines.CTime1 | 925 |
| RoadLines.CTime2 | 0 |
| RoadLines.VehicleID | 1 |
| RoadLines.OrigSourceCode | <null> |
| RoadLines.RoadNetworkID | 1 |
| RoadLines.RoadTypeID | 1 |
| RoadLines.OrigDrainID1 | 7071609251 |
| RoadLines.OrigDrainID2 | 7071600001 |
| RoadLines.GRAIFOID1 | 81 |
| RoadLines.GRAIFOID2 | 81 |
| RoadLines.SurfaceTypeID | 2 |

Road Line Import Errors

Access Database Table RDErrorLog

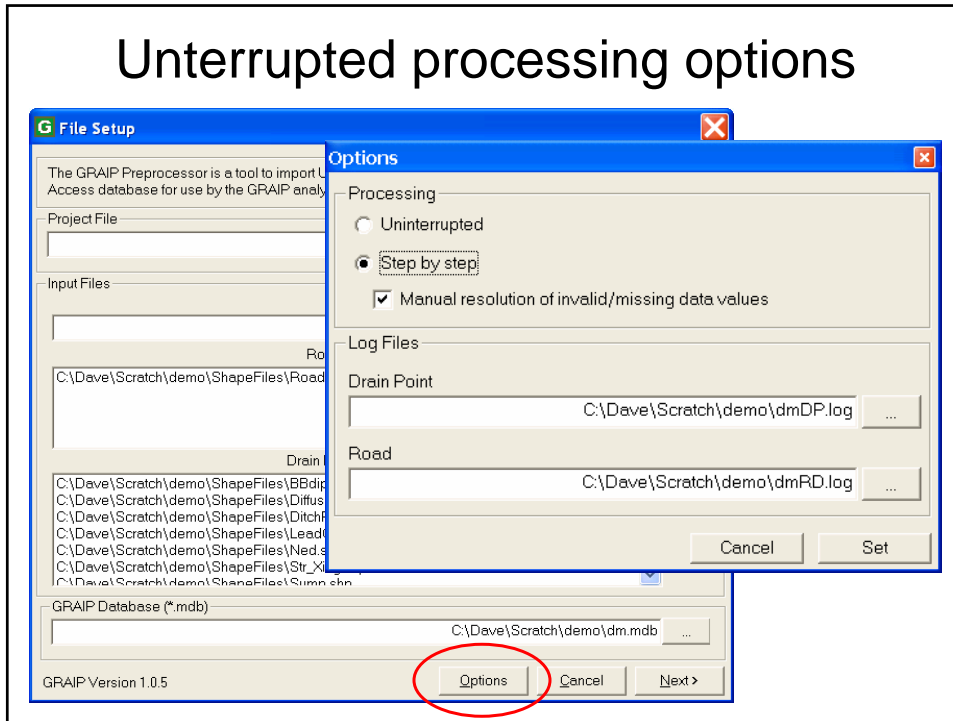
| Index | GRAIPRID | RoadType | ErrorMessage | ActionTaken |
|-------|----------|----------|---|---|
| 1 | 0 | Default | Value '>50' in field 'FillChannelID' is not in the definitions table. | |
| 2 | 2 | Default | Value 'High clearance' in field 'RoadTypeID' is not in the definitions table. | Reassigned value as High clearance road |
| 3 | 38 | Default | Value '0-20' in field 'FillChannelID' is not in the definitions table. | Reassigned value as 1-20 |
| 4 | 148 | Default | Value 'Rd hits channel' in field 'FillChannelID' is not in the definitions table. | Reassigned value as 0 |

Default selection logged as no action

Text logfile *Rd.log

```
dmRD.log - Notepad
File Edit Format View Help
"GRAIP Project File:C:\Dave\Scratch\demo\dm.graip"
"GRAIP Database File:C:\Dave\Scratch\demo\dm.mdb"
"09-17-2007", "22:09:19"
"GRAIPRID", "Type", "Error Message", "Action Taken"
0, "Default", "value '>50' in field 'FillChannelID' is not in the definitions table.", ""
2, "Default", "value 'High clearance' in field 'RoadTypeID' is not in the definitions table.", "Reassigned value as High clearance road"
38, "Default", "value '0-20' in field 'FillChannelID' is not in the definitions table.", "Reassigned value as 1-20"
148, "Default", "value 'Rd hits channel' in field 'FillChannelID' is not in the definition:", "Reassigned value as 0"
```

Uninterrupted processing options



Questions?

