Mapping Guide Appendix

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I. Acquiring Data

Data Locations:

- 1. Your regional river scientist
- 2. The River Management Stream Geomorphic Assessment Tool (SGAT)
- 3. The River Management Online Data Management System (DMS)
- 4. The Vermont Center for Geographical Information (VCGI)
- 5. Your local Regional Planning Commission (RPC)
- 6. The River Management FTP site

Required Date:

Source	Data
DIG	Phase1MappingExport.dbf
DMS	Phase2MappingExport.dbf
	S05swfinaldslv
SGAT	Seg01swseg
Derived Data	S06rtps
Folder	S09corridor
(Project	Fit01ptimpactseg
Folder)	Fit01lnimpactseg
	S11sw
	S15WR emergency roads line.dbf
SGAT Base Data Folder (Project Folder)	Subwatershed theme (User Created)
	Vermont Road Data (E911 recommended)
	Vermont House and Driveway Data (E911)
VCGI	Ortho Photos (NAIP recommended)
	Vermont NWI Wetlands Maps
	Vermont State Political Outline
FTP	Corridor Plan Style
RPC	Parcel Data

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Data Requirements:

If you are making a *Land use and Land cover map* you will need to use the S15WR_emergency_roads_line.dbf. This dbf is created by SGAT step 15. Check the "derived folder" in the SGAT project to see if this step has already been run. If not, this means you must have ArcView GIS 3.x, the extension (SGAT 4.59) and the most up to date SGAT project. If you are missing any of these, please contact your regional river scientist.

SGAT STEP 15:

When starting SGAT select the Stream Geomorphic Assessment Tools (SGAT) button.
Because we want to conduct a density analysis, next choose the Part C: Soils, Land Cover and Density Analysis button
Now select Step 15: Calculate Feature Density for Selected Boundaries. This will bring up the "(Part C) Step 15: Calculate Densities" window
(Part C) Step 15: Calculate Densities
Boundary Theme Defining Areas for which Density will be Calculated
FIRST Select Area for Boundary Theme Theme Name: millsub4.shp
C Corridors (Step 09) Theme for Sub-W/atersheds to be used.
Data Theme and Extraction Criteria
Theme: Not Selected Select input theme for which density values will be calculated.
Feature Selection Criteria
Use Feature Selection
Held INeme: Not Selected Select multiple.
Units:
RequiredTheme(s)
Reach Points: S06RPts01.shp Theme for Reach Points to be used.
Table IN ame: Data Theme Not Selected
User Note:
Calculate Density Done

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Vermont Agency of Natural Resources We are interested in the densities within the Sub-watershed boundary, so select the "Sub-Watershed (Source)" circle.

Boundary Theme Defining Areas for which Density will be Calculated		
FIRST Select Area for Boundary Theme © Sub-Watershed (Source)	Theme Name: s00subsheds, ga.shp	
C Corridors (Step 09)	Theme for Sub-Watersheds to be used.	

Once this is selected you must select the "Data Theme and Extraction Criteria" (the road shape file).

Click on the "Theme" drop-down arrow and choose the "Select Shape File" option.

Data Them	ne and Extraction Criteria	
Theme:	Not Selected	-
Feature	Not Selected	_
	Select Shape File	
Field		•

When you choose "Select Shape File" from the drop down menu, the "Select Shape File" to be used in calculating densities." window pops up.

For the sake of uniformity, we ask that everyone uses the Emergency E911 Roads File. Navigate to the location where you have the E911 roads layer saved on your computer and press the "OK" button.

🔕 Select shape file to be used in calculating densities.			
File Name: emergency_rds_line.shp	Directories: c:\base map serve\road		ок
emergency_rds_line.shp	C:\ base map serve road	×	Cancel
List Files of Type: Shape Files	Drives:	•	

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This will bring you back to the main "(Part C) Step 15: "Calculate Densities" window -Here you can see that an "Output Table, S15WR_emergency_rds_line.dbf and S15WU_emergency_rds_line.dbf" will be saved in your projects Derived Data folder.

Output Table		
Table Name:	S15WR_emergency_rds_line.dbf and S15WU_emergency_rds_line.dbf	
To be saved in: c:\projects\castleton\sgat_fit project files\DerivdData\		

Calculating density:

Add the "S15WR_emergencyroads.dbf" to your ArcGIS 9x project.

When SGAT created this "density" dbf, it didn't actually create a density output; instead the dbf has a data column for area of subwatershed (ft^2) [GEOSWAREA] and total length of roads per subwatershed (ft) [NUMUNITS]. For these maps we are interested in the density of Roads per subwatershed mi² (or another way of saying it is, miles of road per square mile of subwatershed (area)). In order to get this information we must do a simple calculation.

First open the attribute table for "S15WR_emergencyroads.dbf" and select "Options" \rightarrow "Add Field..."



This will bring up the "Add Field" pop up window. Enter the "Name:" "rds_sqmile" and the "Type" "Short integer"

Add Field	<u>?</u> ×
Name:	rds_sqmile
Туре:	Short Integer
Field Prop	perties
Precisio	n 0
	OK Cancel

Press the "OK" button.

Now we have a new column. We want to populate this column with a calculated value. In order to do this we need to start editing this layer.

Open your editor toolbar. Choose "Editor" \rightarrow "Start Editing" and select the location where this dbf is saved. Make sure you see the "S15WR_emergency_rds_line" in the list of layers and tables available for editing.

Start Editing		? ×
Which folder or database do you want to edit data fro	im?	
Source	Туре	
C:\arcgis\vermont\roads vt\E911 RDS	Shapefiles	
C:\arcgis\ch 5 test	Shapefiles	
C:\arcgis\vermont\mapserve projects\Castleton	Shapefiles	
•		
These layers and tables will be available for editing:		
Phase2MapTable Phase1MapTable		_
s05swfinaldslv		
seg01swseg		
phase2_condor		
Phase 1 corridor		
Phase1MappingExport		
Phase2MappingExport S15WR emergency rds line		
		_
	OK	Cancel

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Vermont Agency of Natural Resources Press the "OK" button.

Right Click on Field heading "rds_sqmile" and select "Field Calculator..." from the dropdown menu.



This will bring up the "Field Calculator" window. We want to write and equation that both divides the road length per subwatershed and by the area of the subwatershed and converts feet to miles.

Type "(" and double click on "NUMUNITS" field, so that it populates the lower window. Single click on the divide symbol

Now double click on the "GEOSWAREA" field and type ")"

Again single click on the divide symbol and type "5280" (this is the number of feet per mile) You equation should look like the one seen below.

Field Calculator		<u>? ×</u>
Fields: OID SOLIBCESTEP	Type: ≅ ● Number	Functions:
BNDRYTYPE SUMLEVEL GEOSWAREA UNITS RCHPTID NUMUNITS rds_sqmile	○ String ○ Date	Cos() Exp() Fix() Int() Log() Sin() Sar()
rds_sqmile =	Advanced	+ - =
([NUMUNITS] / [GEOSWAREA]]/5280	*	Load Save Help
Calculate selected records only	Y	OK Cancel

Click on the "OK" button and this will populate your new field with road density values.

DMS:

Login to the DMS (<u>https://anrnode.anr.state.vt.us/ssl/sga/security/frmLogin.cfm</u>), using your user name and password.

Export Tables (dbf):

Select projects from the top menu



Choose Phase 1 from the menu in the left column and then in the main window navigate to your project

Once your project is open, select "Data Export" from the left column. This will bring up the "Export Phase 1 Data" page.

Before you export the data for Phase 1, be sure to check the "SGAT Upload" tab to see if the "S14LW12" table has been uploaded. If the table has not been uploaded, you will need to check

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the SGAT "derived folder" to see if it has already been created. If not run SGAT Step 14 for the LuLc of the individual sub-watersheds to generate this table; then upload the "S14LW12" to the DMS. This table is needed to have accurate data for the Land-use/Land-cover map described on page 32. After the table has been uploaded into the DMS, you can export the Phase 1 data.

Projects List
Phase 1
Background
Themes upload
SGAT upload
▶ Trib names
Exclude reaches
Data entry
▶ RIT upload (old)
FIT upload
▶ Reports
Data export 🔹 🕨

Here you will click on the "Export" button for the File called "Phase1MappingExport.dbf". This will bring you to the "Phase 1 Exported DBF files for Project X" page.

Dataset	Description	Filename	Field List	Action
All data	The complete list of Phase 1 fields	Phase1.dbf	View	Export
Phase 1 Mappping Source	The list of Phase 1 Map Serve fields.	Phase1MappingSource.dbf	View	Export
Phase 1 Mapping Export	The list of Phase 1 Map Serve fields without extras	Phase1MappingExport.dbf	View	Export

You are only interested in the "Phase1MappingExport.dbf", so right click on it and choose "Save Link As..." (or "Save Target As..")

File Name		File Size		Date Exported	
PHASE1.DBF		170,402	kb	04/13/2007 11:53	
Phase1MappingExport.dbf		41 356 ki	b	07/20/2007 11:10	
	Open Link in New <u>W</u> ind	ow			
	Open Link in New <u>T</u> ab				
E	Bookmark This Link				
	5ave Lin <u>k</u> As				

Select Phase 2 from the left column and again navigate to the project you are working on.

Once your project is open, select "Data export" from the left column. This will bring up the "Export Phase 2 data" page.

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Projects List	
▶ Phase 1	
Phase 2	
Background	
Upload Excel	
Data entry	
Reports	
Data export	•

Click on the "Export" button for the File called "Phase2MappingExport.dbf". This will bring you to the "Phase 2 Exported DBF files" for "Project X" page.

Dataset	Description	Filename	Field List	Action
All data	The complete list of Phase 2 fields	Phase2.dbf	View	Export
Controls	Grade control data for Phase 2	Controls.dbf	View	Export
Constrictions	Channel constriction data for Phase 2	Constrict.dbf	View	Export
FEH data	SGAT data for Flood Erosion Hazard	StrmCorDat.dbf	View	Export
Phase 2 Mapping Source	The list of Phase 2 Map Serve fields.	Phase2MappingSource.dbf	View	Export
Phase 2 Mapping Export	The list of Phase 2 Map Serve fields without extras.	Phase2MappingExport.dbf	View	Export

You are only interested in the "Phase2MappingExport.dbf", so right click on it and choose "Save Link As..." (or "Save Target As..")

File Name	File Size	Date Exported
Phase2.DBF	41,354 kb	11/08/2006 08:25
Phase2MappingExnort.dbf	31,270 kb	07/20/2007 11:27
StrmCorDat.D Open Link in New <u>W</u> indow Open Link in New Tab	8,328 kb	08/28/2006 08:28
Bookmark This Link Save Lin <u>k</u> As		

Be sure to open and look at the Phase 1 and Phase 2 export tables prior to working with them in the next steps. It is valuable to review the tables to make sure the data was exported as expected and that there are no obvious errors in the tables (for example data missing from a reach you were expecting there to be data for) before getting too far into the process.

Vermont Center for Geographical Information VCGI:

If you do not already posses road data, building data or ortho-photography for the project, navigate to <u>http://www.vcgi.org/dataware/</u> here you can access road data for the entire state.

Using the "Theme" pull down menu, navigate to the transportation networks page.



Download the data layers with file names "EmergencyE911_RDS"* and "EmergencyE911_ESITE" (These are free downloads). These downloads provide you with roads and data for houses driveways, phone booths, and hydrants.

If you do not have NWI wetland data, navigate to the "Freshwater Resources" page.

Download the theme called "WaterWetlands_NWI". These are the national wetland inventory maps for the state of Vermont. This would be a very large file for the entire state, so VCGI has broken it down into quads (make sure to get all of the themes that cover your project area).

If you do not have a political outline of Vermont, navigate to the "Boundaries (Admin – Political) page.

Download the theme called "BoundaryState_VTBND". This is an outline for the entire state of Vermont

*, "EmergencyE911_RDS.zip", "EmergencyE911_ESITE" and Wetlands are folders that have been compressed or "zipped. Zipping is a file compression technique, designed to make files more manageable. Once this file is downloaded to your computer you must un-zip it. If you do not currently posses the ability to un-zip a folder please download WinZip from <u>www.winzip.com</u> (\$29.95) or another zipping utility.

10) If you do no posses ortho-photography for your project you will be able to order a DVD of 2003 NAIP Photographs for the entire state (\$150). Navigate to the theme page for Imagery and Photographs and click on the "more info" 2 button for NAIP2003.



If paying \$150 is not feasible contact your regional river scientist or your local RPC for another option.

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Local RPC:

If you are making the Sediment regime departure map it would be helpful to have the Parcel data for your projects watershed.

This data is not available though the VCGI website.

Contact your local RPC and ask for the shape file of parcel data.

The FTP Site:

Navigate to <u>ftp://ftp.anr.state.vt.us/</u> and login. If you do not posses the proper login information, contact your regional river scientist.

Once you are logged in, navigate to the folder called "corridor plan". Save the contents of this folder on your computer in the same location you have saved everything else.

In this folder there is a file which contains symbology for each line and point file you will be creating for each map. If you feel that the provided symbology does not fit your needs feel free to symbolize as you see fit. You are not required to use the provided symbology. By using the symbology provided the symbols will offset correctly from the stream to help better display your data. If you chose not to use the provided symbology, you may want to look at offsetting your symbols from the stream line to better display your data.

II. Getting Started

Note: the maps can be developed using *other* GIS mapping software, however the images and instructions below were developed using ArcGIS 9.3.

Open a new ArcMap9x project.

Setting the projection:

Right click on the "Layers" data frame and select properties from the drop down menu. Select the "Coordinate System" tab and in the lower box select a coordinate system in "Predefined" → "Projected Coordinate Systems" → "State Plane" → "Nad 1983" → "NAD 1983 State Plane Vermont FIPS 4400".

Click the "OK" button.

Add all layers to the project, (S15WR emergency roads. dbf, Phase1MappingExport.dbf, Phase2MappingExport.dbf, S05swfinaldslv.shp, Seg01swseg.shp, *S06rpts*, S09corridor.shp, Fit01ptimpactseg.shp, Fit01lnimpactseg.shp, *S11SW.shp*, SubWatershed.xxx, Vermont Road Data (*E911 recommended*), Vermont House and Driveway Data (E 911), Ortho Photos (*NAIP recommended*), Vermont NWI wetland layer and the Vermont State political outline.), Vermont State Political Outline, Parcel Data.

Click on "Tools" from the upper menu. Select "Styles \rightarrow Style References" from the drop down menu. Click on the "Add" button and then navigate to the "Ch5_Map" style. Click "OK" followed by "OK".

Note: if you are making a LU/LC map you must run SGAT step 15 (Calculate features densities for selected boundaries)

Save the Project! Follow the old adage "save early, save often! This will save you much heart ache and consternation.

Creation and Joining of Tables

Create new data layer by joining "s05swfinaldslv" to "Phase1MappingExport.dbf".

Join using "REACHPTID" field. Rename this layer for future recognition. Rename this layer: "Phase1MapTable"

Right click on the s05swfinaldslv shape file and select "Copy".

D M c0Ecul	
- € 5035₩I	🖻 Сору
🖃 🗹 seg01:	X <u>R</u> emove

Right click on the data frame (Layers) and select "Paste Layer(s)"



Right click on the new "s05swfinaldslv" layer and select "Joins and Relates" \rightarrow "Join".

- ✓ s05swfinaldsl	L III L CODA	$ Y \rangle$
🗄 🗹 seg01swseg	X Remove	LLAT
∃ 🗹 s09corridor	Open Attribute <u>T</u> able	H
Phase1Manni	Joins and Relates	Join
Phase2Mappi	🍓 Zoom To Layer	R <u>e</u> move Join(s)
🛜 C:\arcgis\vermon ∃ 🔽 emergency r	Visible Scale Range	<u>R</u> elate
	Us <u>e</u> Symbol Levels	Re <u>m</u> ove Relate(s) 🕨
C:\arcgis\vermon	Selection	
	Label Features	
	Convert Labels to Annotation	
	Gonvert Eeatures to Graphics	FIL
	Data 🕨	
	Save As La <u>v</u> er File	<u>هم</u>
	Make Permanent	
	Properties	0 M

This will bring up the Join Data window. For option #1 "Choose the field in this layer that the join will be based on:"

Choose "RCHPTID"

For option #2 "Choose the table to join to this layer, or load the table from disk:"

Choose "Phase1MappingExport"

For option #3 "Choose the field in the table to base the join on"

Choose "REACHPTID"

Follow these directions for all the joins in the next section.



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Vermont Agency of Natural Resources The click "OK" In order to recognize this layer in the future rename this layer: "Phase1MapTable"

🖃 🗹 Phase1MapTable

Create new data layer by joining "seg01swseg.shp" to "Phase2MappingExport.dbf". Join using "PH2SEGID". Rename this layer for future recognition. Rename this layer: "Phase2MapTable".

Create new data layer by joining "s09corridor.shp" to "Phase1MappingExport.dbf". Rename this layer for future recognition. Rename this layer: "Phase1CorridorMapTable". Follow "join" directions provided above.

Create new data layer by joining "subwatershed" to "Phase1MappingExport.dbf". Rename this layer for future recognition. Rename this layer: "Phase1Subshed"

Note: Be sure to open and look at the attribute tables of the new data layers after you have done the joins to see that the data was joined correctly before moving on to the mapping.

Create new data layer by joining "subwatershed" to "S15WR_emergencyroads.dbf". Rename this layer for future recognition. Rename this layer: "Roads Subwatershed"

Create new data layer by editing "s09corridor.shp" to include segment breaks developed in Phase 2

Now because we are editing the shape file we must make this a new shape file (in order to preserve the non-segmented s09corridor shape file). Right click on one of the "s09corridor layers" and select "Data" and "Export Data" from the drop down menu.

E 🗹 fit01lnimpact	<u>D</u> ata	Set Data Source
🖃 🗹 s05swfinalds	Save As La <u>v</u> er File	Export Data
⊡ 🗹 seg01swseg	Make Permanent	🐂 🧝 Review/Rematch Addresses
- 🗹 phase2 corri	Properties	

Export "All features" using the "layer's source data" for the coordinate system (though the data frame should have the same coordinate system).

Choose a location where you want the file saved on your computer (we recommend keeping all your data in the same location). Rename this layer: "Phase_ 2 _corridor"

Export l	Data 🔹 👔
Export	All features
Use the	same coordinate system as:
💿 this l	ayer's source data
C the c	lata frame
C the f (only	eature dataset you export the data into applies if you export to a feature dataset in a geodatabase)
Output s	hapefile or feature class:
C:\arcg	is\ch 5 test\Phase 2 corridor.shp 🗃
	OK Cancel

Click the "OK" button.

A pop up window will ask you if you would like to add this data to the map as a layer. Click "Yes".

АгсМар		
⚠	Do you want to add the e	exported data to the map as a layer?
	Yes	No

This layer will be added to your table of contents.



We are going to modify (segment) the corridor based on the Phase 2 segment points, so change your "seg01segptsproj" (segment points) symbol to something larger and recognizable.

- 🗸	seg01segptsproj
	•

Editing:

If your editor window is not already open. Select View \rightarrow Toolbars \rightarrow Editor. Left click on the Editor button and select "Start Editing".

Edito <u>r</u> 🔻		*	0	•	Т
<i>:0</i>	Star <u>t</u> E	diting			
=ø	Stop E	diting			

Choose the "Cut Polygon Features" option from the "Task:" drop-down menu (found under the subheading "Modify Tasks").



Make sure you select the proper layer from the "Target" drop down menu.



Your editor tool bar should look like this.

Editor 👻 🕨 🖉 👻 Task: Cut Polygon Features 💽 Target: Phas	e_2_corridor
--	--------------

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Select the "Edit Tool" (the arrow-like pointer)

Use this tool to select the polygon that you want to segment. This will create a halo (usually yellow or blue in color by default) outlining the polygon you selected. Once the polygon is selected, change to the "Sketch Tool". Use this tool to draw a line that cuts the polygon at the segment point. First click once on one side of the polygon (creating a red square) and drag the mouse to the other side of the polygon. Make sure the thin gray line falls on top of the segment point. Double click on the opposite side. This will segment that shape and add a new entry to the attribute table.



Repeat these editing steps slicing the "Phase_2_corridor" at all the segment point locations for your project.

Remember to save your edits often by left clicking on the "Editor" button and selecting "Save Edits" from the drop down menu.



Once all polygons cuts have been made, we must rename the new polygon with phase 2 segment names. Open the attribute table for the "Phase_2_corridor".

If there were no segments made within a reach the segment will not need to be edited.

Make sure the attribute table window is small enough so that you can look at the "Phase_2_corridor" in the back ground.

Select a single entry in the table by clicking on the gray box to the far left on the entry. This will highlight the feature in the table and in the background map. Navigate to this location of the map.

Looking at the entire reach, figure out where this segment is located on the reach, e.g. "A" "B", "C" etc.

Below you see a table with the Feature ID 53 highlighted. On the map the feature is also highlighted. This Segment is located between the 2^{nd} and 3^{rd} segment points

(seg01segptsproj) from the downstream end. This means that it is the 3^{rd} segment or segment "C".

Click the curser inside of the "RCHPTID" field for this feature and add the letter "C" to the T02.09-s1.04 so that it reads T02.09-s1.04C.

 Attributes o	f Phase_2_	_corridor	_ 🗆 🔀	. 4
FID	Shape*		RCHPTID 🔺	
41	Polygon	T02.05-s1.02-s2.02-		
42	Polygon	T02.05-s1.02-s2.01-		
43	Polygon	T02.05-s1.03-		
44	Polygon	T02.05-s1.02-		3
45	Polygon	T02.11-s1.04A		🖌 🥳 ()]
46	Polygon	T02.11-s1.04B		
47	Polygon	T02.11-s1.04C		
48	Polygon	T02.11-s1.04D		
49	Polygon	T02.11-s1.02A		
50	Polygon	T02.11-s1.02B		
51	Polygon	T02.09-s1.04A		
52	Polygon	T02.09-s1.04B		
53	Polygon	T02.09-s1.04		
54	Polygon	T02.09-s1.04		
55	Polygon	T02.09-s1.04		
56	Polygon	T02.09-s1.01		
57	Polygon	T02.09-s1.01		
58	Polygon	T02.09-s1.02		56 /
59	Polygon	T02.09-s1.02		
60	Polygon	T02.11		A A

Repeat this until all segments are renamed in the "RCHPTID" field. Save your edits and stop editing.

Right click on the "Phase_2_corridor" and select "Joins and Relates" \rightarrow "Join" from the drop down menu.

 Phase2Mar C:\arcgis\vern emergenc C:\arcgis\vern 	₽ ×	Copy Records Remove Open			
□ NAIP_Ima	ļ	Joins and Relates	•	<u>]</u> oin	
		Data	+	R <u>e</u> move Join(s)	•

This will bring up the Join Data window. For option #1 "Choose the field in this layer that the join will be based on:"

Choose "RCHPTID"

For option #2 "Choose the table to join to this layer, or load the table from disk:" Choose "Phase2Mapping Export table"

For option #3 "Choose the field in the table to base the join on"

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Vermont Agency of Natural Resources Choose "PH2SEGID" (this is the field that you just modified to hold the Phase 2 segment IDs)

Join Data Join lets you append additional data to this layer's attribute table so you c for example, symbolize the layer's features using this data.	an,
Join lets you append additional data to this layer's attribute table so you o for example, symbolize the layer's features using this data.	an,
What do you want to join to this layer?	
Join attributes from a table	
1. Choose the field in this layer that the join will be based on:	
RCHPTID	
2. Choose the table to join to this layer, or load the table from disk:	
🕮 Phase2MappingExport 💽 🖻	
Show the attribute tables of layers in this list	
3. Choose the field in the table to base the join on:	
PH2SEGID	1
	-
Advanced	
About Joining Data OK Cance	el

Click "OK"

Displaying Unique Data From Within Data Sets:

In ArcMap there are two ways in which you can display unique data. You can either set a definition query or use a use a unique value in symbology (both options work equally as well). These directions require the user to know how to do both.

If you have questions about setting definition queries or symbology please refer to the ArcMap 9.x help menu, or contact your regional scientist.

IV. MAPS

Location Map

In order to have a Location or Reference Map shown in layout view we must make this map as a separate data frame.

Select "Insert" \rightarrow "Data Frame" from the upper menu



The new data frame will appear in your table of contents. Rename (by left clicking once to highlight "New Data Frame", clicking a second time and then typing over this and hitting enter)

this data frame "Location Map" 🥃 Location Map

This data frame is going to show the location of the sub-watershed overlain on the entire state of Vermont. To do this, add the political Vermont boundary shape file and the SubWatershed shape file.



Change the fill color for "SubWatershed" to black by single clicking on the map symbol in the table of contents and then selecting black from the color pallet drop down menu. Click "OK".



Click on the zoom to full extent button 🔎 to see the entire state of Vermont.

Note: For the next series of maps, data needed for the maps will be shown in a couple formats, 1) a list of data layers and the number of copies needed for each layer, and 2) a "mapping data" table.

The "mapping data" table provides you information about why certain parameters are used, the range of values a parameter may have, and the export code used for that parameter in the Phase 1 and/or Phase 2 export tables.

Data calculations and/or normalizations that are described in the "attribute information" column for the "mapping data" table have already been done in the DMS. The Phase 1 and Phase 2 export tables contain the appropriate data values needed for each map.

For each map the "mapping data" table may have several parameters listed. Many of them contain an "and/or" descriptor. This is an indication that the user may chose to show either both types of data described, or may chose to only show one of the parameters; depending on which parameter (or both parameters) best displays the data. The "or" parameter indicates that there are several display options available. For those with an "and", include all the data suggested.

Use your best judgment when making these maps as to how to display your data so that you can read and use the maps. If you can not create the maps such that you can read and use the data, change the map, for example: try reducing the amount of data displayed and spread the information over a few maps instead of on one; or change the scale of your maps – you may choose to show your watershed over a couple maps so that it is a larger scale. Map size can be an important aspect of cartography. When displaying data at the reach scale data, 8x10 maps are

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adequate, but 11x17 maps should be used, if possible, for watershed scale maps. The goal of these maps is to help display your data in a visual format; allowing you to look at your data in a comprehensive way. Attention to format and mapping techniques will help you in the long run use the maps and the data more affectively.

You may or may not have all the parameters/impacts discussed for the map in your watershed. It may be valuable to note those features not present in the map legend and/or in the Corridor Plan section that discusses the results of the map.

Hydrologic Alterations Map:

The hydrologic alterations map will show stormwater input data, number of stormwater inputs per mile, dams, flow regulations, and upstream flow modifications.

To keep the map organized we recommend that you create a new data frame for this map. Select "Insert" \rightarrow "Data Frame" from the upper menu

<u>Eile E</u> dit <u>V</u> iew	Insert	<u>S</u> election	<u>T</u> ools	Win	dow	<u>H</u> elp
🗅 🚅 🖬 🖨	5 D	ata Frame		5	2	+
Layer: fit00ptim	i 🖻	le		•	0	*
	A Te	e⊻t		F		-

The new data frame will appear in your table of contents. Rename this data frame "Hydrologic Alterations" **Hydrologic Alterations**

Copy and paste all the data layers need for this map.

# of copies	Data
2	Fit01ptimpactseg
3	Phase2MapTable
1	Emergency Roads Line
1	S05swfinaldslv
1	SubWatershed

Note: Rename the data layers so that they represent the data being displayed



Mapping Stormwater Data:

SGAT Feature Type	Attribute Information			
FIT point data	Storm water discharges – the indexed ditch outlets, culverts, or pipes collecting and conveying stormwater to the segment (or reach)			
AND/OR Stream segment - line data	Phase 2 data (Steps 4.6) attributing the segment line to indicate the number of storm water inputs $(0 \le 2; >2 \le 5; >5)^*$ Export Code: STRM_RNG * note: normalized values - # storm water inputs(5,280)/segment length			
Additional Resources				
Storm water outfalls inventories – point data obtained through DEC Storm water Section, regional or municipal planning agency				

Use the "Stormwater" data layer to display any points that have an "Impact" equal to "Stormwater input". Set the definition query to "Impact = Stormwater input" or by categorizing by "Unique Value" in "Symbology" based on the "Value Field" "IMPACT". Add the value "Stormwater input":

Be sure to uncheck the "all other values" field, so you only display the impact you are interested in.

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Change the symbol to the green "stormwater" symbol. Delete the <Heading> "IMPACT"

To map the number of storm water inputs per segment use the "Stormwater/mile" data layer and categorize by "Unique Value" with a "Value Field" of "Phase2MappingExport.STRM_RNG". The range categories are (<=2), (>2<=5) and (>5). Add all relevant values.

ayer Properties				<u>?</u> ×
General Source Select Show: Features	on Display Symbology Fields Draw categories using uniq	Definition Query Labels	Joins & Relat	es Import
Categories Unique values Unique values, many I	Value Field Phase2MappingExport.STRM_	RNG		•
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value <all other="" values=""> <heading> <=2 >2 <= 5 >5 >5</heading></all>	Label <all other="" values=""> Phase 2 stormwater <=2 >2 <= 5 > 5</all>	/mi ? ? ? ?	1

Unique Value in Symbology

Change symbol lines to the varied thickness red stormwater lines for (<=2), (>2<=5), and (>5) respectively.

Change the "<Heading>" "STRM_RNG" to say "Range" (by left clicking on the heading and then typing over it).

Mapping Dams and Diversions Data:

SGAT Feature Type	Attribute Information
FIT point data	Flow regulation points attributed as large withdrawals (diversions) and/or large store and release impoundments.
OR Stream segment – line data	Phase 2 data (Steps 4.5) attributing the segment line to indicate that large withdrawals (diversions) and/or large store and release impoundments exist within the reach, Export Code: SIG_FLOW_REG and Step 4.6 data indicating that upstream flow regulation or water withdrawal are affecting the reach. Export Code: UPSTR_FLOW
OR Stream reach – line data	Phase 1 (Step 5.1 data) attributing the reach line to indicate the existence of large withdrawals (diversions) and/or large store and release impoundments Export Code: SIG_FLOW_REG
Additional Resources	
Vermont Dam Inventory (VC "status" attributes which indi	CGI) – GIS point data selected and coded with "purpose" and cate that the dam significantly affects flow

Using the "Dams and Diversions" data layer, display any points that have a subimpact equal to Dam. This can be done by setting a definition query or by using Unique Value in Symbology with "SUBIMPACT = Dam", based on the field ""SUBIMPACT":



Change the symbol to the blue and grey Dam symbol.

Use one of the Flow modifiers data layers to see if there is a flow regulation within the reach. Categorize by "Unique Value" to display "SIG_FLOW_REG = Yes", based on the "Value Field" "Phase2MappingExport.SIG_FL_REG". Add the Value "Yes":

Layer Properties			<u>? ×</u>
General Source Selecti	ion Display Symbology Fields D	efinition Query Labels Joi	ns & Relates
Show:	Draw categories using unique	values of one field.	Import
Features	Value Field	Calas Dana	
Lategories			
- Unique values - Unique values, many I	Phase2MappingExport.SIG_FL_RE		
Match to symbols in a	Sumbol Value	Label	Count
Quantities	Zall other values	Zall other values>	o
Charts		Within Beach	11
Multiple Attributes	No	No	11
	Add All Vishues	Perrove A	
		OK Car	ncel Apply

Unique Value in Symbology

Change symbol to the closed circle "in-reach flow mod" line symbol. Change the "<Heading>" to say "Within-Reach"

Use the other Upstream Flow modifiers data layer to show if an upstream flow regulation exists. Categorize by "Unique Value" to display "UPSTR_FLOW = Yes", based on the "Value Field" "Phase2MappingExport.UPSTR_FLOW". Add the value "Yes":

Layer Properties				? ×
General Source Select	tion Display Symbology	Fields Definition Query	Labels Joins & Re	elates
Show: Features	Draw categories usir	ng unique values of one	e field.	Import
Categories Unique values Unique values, many I	Value Field Phase2MappingExport.		Ramp	•
Match to symbols in a Quantities Charts	Symbol Value	Label	Cour ues> 8	nt
Multiple Attributes	No Yes	Upstream No Yes	8 3	
	Add All Values Add \	/alues Remove	Remove All	Adva <u>n</u> ced 🕶
		OK	Cancel	Apply

Unique Value in Symbology

Change symbol to open circle "upstream flow mod" line symbol. Change the "<Heading>" to say "Upstream"

If you do not have Phase 2 data and/or you would like to show areas where Phase 2 data may not have been collected you may chose to use the Phase 1 Map Table to display where there are flow modifiers within the reach. You may need to add a copy of the Phase 1 Map Table to your data frame if you are going to show the Phase 1 data. Rename the layer to "Phase1 Flow Modifiers". Use this layer to categorize by "Unique Value" to display "SIG_FLOW_REG = Yes", based on the "Value Field" "Phase1MappingExport.SIG_FL_REG". Add the Value "Yes":

Mapping Base Data:

Note: The following directions apply to the base data for each map within this guide.

Change S05 river line to the blue river line.

Layer Properties		<u>?</u> ×
General Source Selec	tion Display Symbology Fields Definition Query Labels Joins &	Relates
Show: Features	Draw all features using the same symbol.	Import
Single symbol Categories	Symbol	
Quantities Charts Multiple Attributes	Advanced -]

Change the Emergency Roads Line to the black and grey roads line.

ayer Properties		?:
General Source Selec	tion Display Symbology Fields Definition Query Labels Join	is & Relates
Show: Features	Draw all features using the same symbol.	Import
Categories Quantities	Symbol	-
Charts Multiple Attributes		<u> </u>

Add the subwatershed layer to your map.

Sample Hydrologic Alterations Map:



Land Use / Land Cover Map

The Land Use / Land Cover map will show urbanization, wetland loss, and road densities. To keep the map organized we recommend that you create a new data frame for this map. Select "Insert" \rightarrow "Data Frame" from the upper menu

<u>File E</u> dit <u>V</u> iew	Insert	Selection	<u>T</u> ools	<u>W</u> in	dow	Help
🗅 🗳 🖬 🖨	🛃 Da	ata Frame		5	Ω.	•
Layer: fit00ptim	i 🖻	le		Ð	0	*
	Te	e⊻t		-		

The new data frame will appear in your table of contents.

Rename this data frame "Land Use / Land Cover	🗉 🥩 Land Use / Land Cover
Copy and paste all the data layers need for this ma	ıp.

# of copies	Data
2	Phase1MapTable
2	Phase1Subshed
-	NWI Wetlands
1	S06rpts
1	Emergency Roads Line
1	S05swfinaldslv
1	S11sw
1	Roads Subwatershed

Rename the layers in the Sediment Load Data frame.



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The NWI wetland layers were also grouped.

To do this hold "shift" or "Ctrl" key and select all layers that you want in the group. Then right click on these highlighted layers and select "Group" from the drop down menu.



Mapping Crop Data:

SGAT Feature Type	Attribute Information
Stream reach – line data	Phase 1 (Step 4.1 data) attributing the reach line to indicate the category of significant crop land use (moderate $\geq 5 < 10\%$; high $\geq 10 < 20\%$, extreme $\geq 20\%$). This is showing the cumulative upstream percentage of crop land for the reach.
	Export Code: CROP_W_RNG
	SGAT table S14LC12.dbf, codes of interest 22, 24, 211, and 212
	attributing the sub-watershed polygon indicating the category of
AND	significant crop land use (moderate $\geq 5 < 10\%$; high $\geq 10 < 20\%$,
Sub-watersheds – polygon	extreme $\geq 20\%$) This is showing the percentage of crop within the
	individual sub-watershed.
	Export Code: CROP_S_RNG

Crop data will be displayed as both line and polygon data.

To show the cumulative effect of crop along the river, use the "Crop" line layer and categorize by "Unique Value" with the "Value Field" "Phase1MappingExport.CROP_W_RNG". The range categories are (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%). Add relevant values.

now:	Denne antennia conta conta		Import
eatures	Draw categories using uniqu	le values of one field.	mporc
Categories	Value Field	Color Ramp	
<mark>Unique values</mark> Unique values, many (Phase1MappingExport.CROP_V		-
Match to symbols in a	Symbol Value	Label	Count
luantities	All other values>	<all other="" values=""></all>	
Jultiple Attributes	<heading></heading>	cumulative effect	
ruitiple Attributes	< 5%	< 5%	?
	>= 5% and < 10%	>= 5% and < 10%	?
	>=10<20%	>=10<20%	?
	>=20%	>=20%	?
5 V 1	Add All Values Add Values	Remove Remov	e All 🛛 Adva <u>n</u> ced 🔻

Change the symbol lines to the increasing thickness yellow crop lines for (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%).

Change the "<HEADING>" "CROP_W_RNG" to say "cumulative effect" (by left-clicking and typing over it).

To show the effect of crop for each unique subwatershed, use the "Crop" polygon layer and display by unique value, with a value filed of the "Phase1MappingExport.CROP_S_RNG". The range categories are (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%), but often not all are present, so just add the ones that are (the relevant values).
now.	Draw c	ategories using uniqu	e values of one fiel	d	Import
eatures	_) (alua Ei	ald			
_ategories				h.	
Unique values	Phase1	MappingExport.CRUP_S			-
Matak ta sustala in a					
Match to symbols in a	Symbol	Value	Label	Count	
luantities		<pre><all other="" values=""></all></pre>	<all other="" values=""></all>		
-harts	L——	<heading></heading>	individual wate	rshed	
Multiple Attributes		1< 5%	< 5%	?	
		>5<10%	>5<10%	?	
		>10<20%	>10<20%	2	T
		>20%	>20%	?	
		1.7.5.5.5	10-00-00		-
Boll and					
The Ar					
		1			
	Add All \	/alues Add Values	Remove R	emove All 🛛 🗛 🗛	/anced 🝷

Change the symbol fills to the varied shades of grey crop fills for (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%).

Change the "<HEADING>" "CROP_S_RNG" to say "individual effect" (by left-clicking and typing over it).

SGAT Feature Type	Attribute Information
Stream reach – line data	Phase 1 (Step 4.1 data) attributing the reach line indicating the category of significant urban land use (moderate $\geq 5 < 10\%$; high $\geq 10 < 20\%$, extreme $\geq 20\%$). This is showing the cumulative upstream percentage of urban land for the reach. Export Code: URB_W_RNG
AND Sub-watersheds – polygon	SGAT table S14LW12.dbf , codes (for urban) to attribute the sub- watershed polygon indicating the category of significant urban land use (moderate $\geq 5 < 10\%$; high $\geq 10 < 20\%$, extreme $\geq 20\%$). Showing the percentage of urban land use within the individual sub-watershed. Export Code: URB_S_RNG

Urban data will be displayed as both line and polygon data.

To show the cumulative effect of urban land use along the river, use the "Urban" line layer and categorize by "Unique Value" with the "Value Field" "Phase1MappingExport.URB_W_RNG". The range categories are (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%), but often not all are present, so just add the ones that are (the relevant values).

ayer Properties			?)
General Source Select	ion Display Symbology Fields	Definition Query Labels Joins	& Relates
Prow: Features Categories Unique values Unique values, many I	Draw categories using unique Value Field Phase1MappingExport.URB_W_F	e values of one field.	Import
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value <all other="" values=""> <heading> <5% >= 5% and < 10% >= 10% and < 20% >=20%</heading></all>	LabelI <all other="" values="">cumulative effect< 5%>= 5% and < 10%>= 10% and < 20%>=20%</all>	Count
	Add All Values Add Values	Remove Remove All	Advanced •

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Vermont Agency of Natural Resources Change the symbol lines to the increasing thickness red urban lines for (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%).

Change the "<HEADING>" "URB_W_RNG" to say "cumulative effect" (by left-clicking and typing over it).

To show the effect of urban land use for each unique subwatershed, use the "Urban" polygon layer and display by unique value, with a value filed of the

"Phase1MappingExport.URB_S_RNG". The range categories are (<5%), (>= 5% and < 10%), (>=10 < 20%) and (>=20%), but often not all are present, so just add the ones that are (the relevant values).

Costuros	Draw c	ategories using uniqu	e values of one fie	ld.	mport
Categories	_ ⊢Value Fi	eld	Color Ran	np	
Unique values	Phase1	MappingExport.URB_S_I			•
Match to symbols in a	Symbol	Value	Label	Count	
guandices Charts		<all other="" values=""></all>	<all other="" td="" values?<=""><td>></td><td></td></all>	>	
Multiple Attributes		<heading></heading>	individual wate	ershed	
	444	/< 5%	< 5%	?	
	¥##	1>><10%	>0<10%	2	1
		>20%	>20%	?	Ŧ
	Add All \	/alues Add Values	Remove	Remove All Adva	nced 🔻

Change the symbol fills to the varied thickness 45 degree line urban fills for (<5%), (>= 5% and <10%), (>=10 <20%) and (>=20%).

Change the "<HEADING>" "URB_S_RNG" to say "individual watershed" (by left-clicking and typing over it).

Mapping Road Densities:

Use the "Road Density" data layer to display four ranges of road densities (0-2, 3-4, 5-6, and >=7). The instructions for creation of the S15WR emergency line layer can be found on pages 6-11.

Use Graduated colors to symbolize quantities within the Field of the "S15WR_emergency_rds_line.mi_sqmile".

	Draw quantities using or	lor to show values	
eatures	Diaw quantities using co	noi to snow values.	
Categories	Fields	Classification	
Quantities	Value: S15WR_eme	argency rds lin 💌 🛛 Natural Breaks (Jenks)	
- Graduated colors	Normalization: (Mono)	Classes: 5 - Classify	
 Graduated symbols 	Normalization. J CNORes		_
 Proportional symbols 			
Dot density	Color Ramp:	•	
Charts	Symbol Bange	Label	
Aultiple Attributes	0.1	0.1	_
	2.2	2.2	
	2-5	2-3	
	4-6	4-0	
1 0 9 97	7.10	7-10	
a second	11 - 13	11 - 13	
A CT			
Front C	1		
WILL AND	📕 🔲 Show class ranges using fe	ature values Advance <u>d</u>	-
			-

Click on the Classes drop down arrow and select 4 classes

Classifica Nat	ation tural	Breaks	s (Jenks)
Classes:	2	•	Classify
	2		
	4		
abel	6		
- 4	7		
- 13	8	•	

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Vermont Agency of Natural Resources In order to set our desired breaks click on the Classify... button. This will bring up the "Classification" window. Here you can see a bar graph showing the values for you field in gray and the default divisions of the classifications in blue.

On the right side of this window type in the values of your cut offs, because you are interested in the ranges 0-2, 2-4, 4-6, and >7, make the values 2, 4, 6, and then what ever the maximum value is for your project (maximum value can be found in the "Classification Statistics" portion of this window).



Press the "ok" button.

Change the symbol fills to the varied thickness 45 degree line urban fills for (<5%), (>= 5% and <10%), (>=10 <20%) and (>=20%). Road densities

101	Draw quantities using color to show values.
eatures	
ategories	
Juantities	Value: S15WR_emergency_rds_lir
Graduated colors	Normalization:
Proportional sumbols	
- Dot densitu	Color Ramp:
Charts	
ultiple Attributes	Symbol Range Label
	0.2 0.2
	3 • 4 3 • 4
	5-6 5-6
	7-13 >7
2.2.2.	
1 M	
	N
Sand (
ath the	r □ Show class ranges using feature values Advance₫ ▼

Change the last "label" to say ">=7" (by left-clicking and typing over it).

Mapping Wetlands:

To show the location of current wetlands use the NWI wetland layer (you must follow these steps for each individual NWI wetland quad you have).

Categorize by "Unique Value. Set the "Value Field" to "ATTRIBUTE".

Add all Values and scroll to the bottom of the list.

Click to highlight the value labeled U (this represents all polygon layers with unknown values).

Click on the Remove button to remove it.

Features Categories 	Value Field	Color Ra	amp	
Lategories Unique values Unique values, many I	ATTRIBUTE		amp	
Unique values Unique values, many I	ATTRIBUTE	-		
Unique values, many I L				-
Match to symbols in a	Symbol Value	Label	Count	-
luantities	PUBH	PLIBH	15	-
harts	РИВНЬ	РИВНЬ	11	
Aultiple Attributes	PUBHh	PUBHb	159	
	PUBHx	PUBHx	20	
	Pf	Pf	2	
	B2UBH	B2UBH	5	
	B3BB1G	B3BB1G	1	
80 -4	B3BBH	B3BBH	1	
Add in the	B3UBH	B3UBH	7	
		BOUGA	1	
	B3USA	BBUSA		
	R3USA	H3USA U	39	-
	R3USA	H3USA U	39	-
S. C.	R3RBH R3UBH	R3RBH R3UBH	1 7	

Hold the "shift" key and select all the remaining values. Right click on these values and select "Group Values" from the pop up menu.

	1110	
		Group Values
	EM	Ungroup Values
		Reverse Sorting
P	EM	Reset Sorting
P	FM	Remove Value(s)

Uncheck the <all other values> box

	Draw c	ategories using unigu	e values of one field	d. Import
Features		eld	Color Baror	
Lategories				,
Unique values Unique values manut	ALTRIE	IUIE		
Match to sumbols in a		-		
Juantities	Symbol	Value	Label	Count
'harte		<all other="" values=""></all>	<all other="" values=""></all>	39
ultinle Attributes		<heading></heading>		1278
		L1UBH; L1UBHh; PEM	1/FC NWI	1278
				4
	Add All V	/alues Add Values	Remove	emove All Advanced 🗸

Change the fill symbol to the NWI fill and change the "label" to say "NWI" (by left-clicking and typing over it).

Click on the "ok" button

Mapping Previously Existing Wetlands:

SGAT Feature Type	Attribute Information
Sub-watershed polygon for soils – S11sw	Hydric soils = "Y" - use light, solid shading of polygons to contrast with darkly outlined NWI (existing) wetlands.
AND Sub-watershed polygon	Length of roads in sub-watershed calculated by running the SGAT tool, Step 15 to derive the density of roads within the sub- watershed. <i>This data is not included in the DMS export table</i> .
Additional Resources	
AND Vermont NWI wetlands map	s – use outline of existing wetlands

This layer is created in Part C Soils, Land Cover and Density Analysis, Step 11 "Clip Data Themes to Selected Boundaries" of the SGAT Tool. If you do not have the S11sw file you will need to run through the steps in Part C. Please see the SGAT Handbook for further instructions.

To display the locations where crop and/or urban features intersect with hydric soils, use the S11sw (Lost Wetlands) data layer. These are areas where there is a likely loss of wetlands. Categorize by "Unique Value". Set the "Value Field" to "HYDRIC". Add all "Y" values. Uncheck the "all other values" field, and delete the heading.

If your S11SW layer does not have the "hydric" information in the attribute table; you will need to join the table to the NRCS "Top_20" table. This can be found in the SGAT "base data" folder. You will use the "MUID" field for the join. Once the table has been joined to the S11SW layer you can display the information as described.

ayer Properties			? ×
General Source Select	on Display Symbology Fields Defin	nition Query Labels Joins	& Relates
Show:	Draw categories using unique val	ues of one field	Import
Features			
Categories	Value Field	Lolor Hamp	
Unique values	HYDRIC		~
Unique values, many I			
Match to symbols in a	Symbol Value	Label	Count
Quantities Charle	All other values>	(all other values>	
Lnar(s Multiple Attributes	KANANA Y		?
Multiple Attributes			
			T
◀ ▶			
	Add All Values Add Values	Remove Remove All	Adva <u>n</u> ced 🗸
		OK Cance	l Apply

Symbolize with a single symbol using the lost wetlands fill.

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Sample Land Use and Land Cover Map:



Sediment Load Indicators Map

The Sediment Load Indicators map will show steep riffles, mid-channel bars, delta bars, flood chutes, avulsions, braiding, erosion, mass failures, Gullies, and tributary rejuvenations, To keep the map organized we recommend that you create a new data frame for this map. Select "Insert" \rightarrow "Data Frame" from the upper menu

<u>F</u> ile <u>E</u> dit <u>V</u> iew	Insert	<u>S</u> election	<u>T</u> ools	<u>W</u> indow	Help
🗅 🖻 🖬 🖨	🛃 Da	ata Frame		50	÷
Layer: fit00ptim	ayer: fit00ptim		1 0	*	
	\mathbf{A} Te	e <u>x</u> t		F	-

The new data frame will appear in your table of contents. Rename this data frame "Sediment Load"

Copy and paste all the data layers need for this map.

# of copies	Data
3	Phase2MapTable
2	Fit01ptimpactseg
2	Fit011nimpactseg
1	Emergency Roads Line
1	S05swfinaldslv
1	SubWatershed

Rename the layers in the Sediment Load Data frame.



Mapping Erosion and Deposition Features Data:

SGAT Feature Type	Attribute Information		
FIT point data	Steep riffles, flood chutes, avulsions, and braiding		
AND Stream segment – line data	Phase 2 data (Steps 5.1, 5.2, and 5.3) attributed to the stream segment line indicating the quantity of steep riffles, mid-channel bars, delta bars, flood chutes, avulsions, and braiding. $(0 \le 2; >2 \le 5; >5)$ * Export Code: DEP_RNG * note: normalized values - # features(5,280)/segment length		
OR Stream reach – line data	Phase 1 (Step 6.3 data) indicating low or high impact rating for depositional features Export Code: I_DEPOSIT		

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Use the "Steep riffle" data layer, to display any points that have a Subimpact equal to Steep Riffle. This can be done by setting a definition query with "SUBIMPACT = Steep Riffle" or by categorizing by "Unique Value" in "Symbology". Set the "Value Field" to "SUBIMPACT". Add "Steep Riffle":



Definition Query

Unique Value in Symbology

Change symbol to blue "steep riffle" symbol.

Delete the "<Heading>" and the label and uncheck the "all other values" box

Use the "deposition/mile" data layer to show the number ranges of depositional features per mile. This can be done by categorizing by "Unique Value". Set the "Value Field" to "Phase2MappingExport.DEP_RNG". Add all relevant values.

General Source Selec	tion Display Symbology Fields	Definition Query Label:	s Joins & Relates
Features Categories Unique values	Draw categories using uniqu Value Field Phase2MappingExport.DEP_RN	G I Color Ramp	Import
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value <ali other="" values=""> <th>Label <ali other="" values=""> Range <=2 >2 <= 5 > 5 Parmano</ali></th><th>Count ? ? ?</th></ali>	Label <ali other="" values=""> Range <=2 >2 <= 5 > 5 Parmano</ali>	Count ? ? ?
			Cancel Applu

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Vermont Agency of Natural Resources

Unique Value in Symbology

Change symbols to red, orange and yellow hashed "deposition" lines. Change the "<Heading>" "DEP_RNG" to "Range"

Mapping Bank Erosion Data:

SGAT Feature Type	Attribute Information
FIT line data	Erosion (right and/or left bank)
	Phase 2 data (Steps 3.1) attributed to lines offset left and right
OR	from segment line indicating the percentage of the reach /
Stream segment – line data	segment (right and left bank) length eroding ($\geq 5 < 20\%$; $\geq 20\%$)
	Export Code: L_EROS_RNG & R_EROS_RNG
OP	Phase 1 data (Step 7.2) attributed to the reach line indicating the
CK Stream reach line data	percentage of the reach length eroding ($\geq 5 < 20\%$; $\geq 20\%$).
Sucan reach – Ine data	Export Code: EROS_P_RNG

Use the "Bank Erosion" data layer to display all location of erosion along the river. This can be done by setting a definition query to "IMPACT = Erosion. Categorize by "Unique Value". Set the "Value Field" to "LOCATION". Add the values Left Bank, and Right bank:

rce Selection Display Symbology Fields Definition Query Labets Joint	
ety:	
Query Builder ? X	
[PH25EGI0] [RCHPTID] [RCHPTID] [RCHPEGID] [NHPACT] SUBIMPACTI	
C> Ligit Back Amoning or Reventment' Bindge or Culvert' Development' Development'	Layer Properties ? X General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
1 < <= Or 2 · (1 Net Staghtening)	Show: Features Trave categories using unique values of one field. Import
It Ger Under Valuer ige Ter i SELECT * FROM #01/minpactureg WHERE: [MPACT] - %rosion	Unice values may
	Quantities Symbol Value Label Count Charts
Claw Verly Belp Lond Sage. OK Cancel	Right Bank Right Bank ?
Definition Query	Unique Value in Symbology

Change symbols to brown "erosion right" and brown "erosion left" lines. Delete "<Heading>".

Mapping Mass Wasting Sites and Gully Data:

SGAT Feature Type	Attribute Information
FIT point data	Mass failure or gully
AND/OR	Phase 2 data (Steps 3.1) attributed to the segment line indicating

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Vermont Agency of Natural Resources

Stream segment – line data	the number of mass wasting sites or gullies $(0 \le 2; >2 \le 5; >5)^*$
	Export Code: MF_GUL_RNG
	* note: normalized values - # features(5,280)/segment length

Use the "Mass failure" data layer to display any lines identifying mass failures. This can be done by setting a definition query to "IMPACT = Mass Failure or categorizing by "Unique Value" in Symbology. Set the "Value Field" to "IMPACT". Add the value "Mass Failure":

on Display Symbology Fields Definition Query Labels Joins & Relates		
Jacry Builder K1 X [TRR0] 3 [PR65600] 3 [RCH970] 1 [RCH970] 1 [RCH970] 1 [RCH970] 1 [RCH970] 1 [RCH970] 1	Layer Properties	
	General Source Selection Display Symbology Fields Definition Query Labels Joins & Re Show: Features Categories Unique values Unique values, many Unique values, many	elates Im
DELECT : Phone Biol parapolicity grane Pie. [IMFACT] = Mars Falure'	Match to symbols in a Symbol Value Label Court Charts Multiple Attributes Att	nt

Definition Query

Unique Value in Symbology

Change symbol to the teal "Mass failure" line symbol. Delete the "<Heading>" and the label.

Use the "Gully" data layer to display points identifying gullies. This can be done by setting a definition query to "IMPACT = Gully" or Categorizing by unique value in Symbology. Set the "Value Field" to "IMPACT". Add the value "Gully":

iery Builder	<u>?</u> ×
"RCHPTID" "RCHSEGID" "IMPACT" "SUBIMPACT" "LOCATION" "DATE"	
= <> Like 'Alluvial Fan' 'Beaver Dam' 'Debris Jam' Dredging' 'Grade Control' 'Gully' <	
Is Get Unique Values Go To: SELECT * FROM fit00ptimpact WHERE: "IMPACT" = 'Gully'	*
Clear Verify Help Load S	iave
Definition Query	

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-

Change symbol to the orange "Gully" circle. Delete the "<Heading>" and the label.

Note: In earlier projects Mass Failures where recorded as points and not lines. Depending on the FIT project you are using, you may have to look for Mass failures in the Fit01ptimpact layer (use the teal "mass failure" diamond symbol).

If you do not have access to good FIT data, use the "Mass failure and gully/mile" data layer to show the ranges of mass failures and gullies per mile for the segment/reach, categorize by "Unique Value". Set the "Value Field" to "Phase2MappingExport.MF_GUL_RNG". Add all relevant values:

ayer Properties				? ×
General Source Select	ion Display Symbology Field	s Definition Query Labels	Joins & Relates	1
Features	Draw categories using unit	que values of one field.		Import
Categories 	Value Field Phase2MappingExport.MF_GL	IL_RN		•
Quantities	Symbol Value	Label	Count	
Charts Multiple Attributes	<pre><all other="" values=""> </all></pre> <heading></heading>	<all other="" values=""> Range</all>	-	
	<=2 ++++>2<=5	<=2 >2 <=5	?	
	+ + + + >5	>5	?	

Unique Value in Symbology

Change symbols to green "mass failure gully" lines. Change the "<Heading>" to "Range"

Mapping Rejuvenating Tributary Data:

SGAT Feature Type	Attribute Information
Stream segment – line data	Phase 2 (Step 5.3) indicating the presence of tributary rejuvenation. Export Code: TRIB_REJUV

Use the "Tributary Rejuvenation" data layer to show whether tributary rejuvenation has occurred on every segment/reach. Categorize by "Unique Value". Set the "Value Field" to "Phase2MappingExport.TRIB_REJUV". Add value "Yes".

ayer Properties			?
General Source Selecti	on Display Symbology Fields	Definition Query Labels	Joins & Relates
Show:	Draw categories using uniqu	ue values of one field.	Import
Categories Unique values Unique values, many I	Value Field Phase2MappingExport.TRIB_RE		•
Match to symbols in a	Symbol Value	Label	Count
Quantities Charts Multiple Attributes	Call other values> < Heading> Yes	<all other="" values=""></all>	2
	100	165	

Unique Value in Symbology

Change symbol to the thick pink "Rejuvenating tribs" line for trib_rejuv = yes. Delete the "<Heading>" "TRIB_REJUV"

Sample Sediment Load Indicators Map:



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	0			11

E. Channel Slope Modifiers Map

The channel slope modifiers map will show head cuts, straightening, encroachments and development within the corridor, grade controls and constrictions, and beaver dams. To keep the map organized we recommend that you create a new data frame for this map. Select "Insert" \rightarrow "Data Frame" from the upper menu.

Rename this data frame "Channel Slope Modifiers".

Copy and paste all the data layers need for this map.

# of copies	Data
3	Phase1MapTable
3	Phase2MapTable
2	Fit01ptimpactseg
2	Fit011nimpactseg
1	Emergency roads line
1	S05swfinaldslv
1	SubWatershed

Rename the layers in the Channel Slope Modifiers Data Frame.



Mapping Slope Increases

Straightening and Channelization Data:

SGAT Feature Type	Attribute Information
FIT data	Head cuts, Straightening, Straightening with Windrowing
OR	Phase 2 data (Step 5.5) indicating percentage of the reach / segment length straightened ($\geq 5 < 20\%$; $\geq 20\%$)
Stream segment – line data	Export Code: P_STRT_RNG
OR	Phase 1 data (Step 5.4) indicating the percentage of the reach length straightened ($\geq 5 < 20\%$; $\geq 20\%$)
Stream reach – line data	Export Code: STRAI_RNG

54

Use the "Head Cut" data layer to display any points identifying headcuts along the entire river. This can be done by setting a definition query to "SUBIMPACT = Head Cut" and then displaying with a single symbol.

i antoni anto	
Layer Praperties	
General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates	
Definition Query: Query Builder 28	
Guery Bulder. 2 1 <	Layer Properties ? × General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Show: Features Import Import Single symbol States States
Cear Verty Heb Load See.	Categories Quantities Charts Multiple Attributes
Definition Query	Single symbol Symbology

Change the symbol to the blue "head cut" circle

Use the "Straightening" data layer to display any lines indicating straightening. This can be done by setting a definition query to "IMPACT = Straightening" and then symbolizing by a single symbol.

Query Builder 🛛 🕐 🕨	
[OBJECTID] 1 [IMPACTID] [ITRIBID] [PH2SEGID] [RCHPTID] [RCHPTID] [RCHSEGID]	
= <> Like > >= And <	
Is Get Unique Values Go To:	Layer Properties
SELECT * FROM fit01Inimpactseg WHERE:	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
[[MPACT] = "Straightening"	Show: Draw all features using the same symbol. Features Single symbol
Clear Verify Help Load Save	Categories Gynbol Quantities Charts Multiple Attributes
Definition Query	Single symbol Symbology

Change the default line symbol for straightening to the red double lined "Straightening" line symbol.

If you do not have FIT data, use the "P2 % Straightening" data layer to show the various percentages of straightening within different reaches/segments. Categorize by "Unique Value" in "Symbology", set the "Value Field" to "P_STRT_RNG". Add all relevant values.

ayer Properties	ian Diselan Sumbology Dista	a Definition Queru I Labo	la Ì Jaina & Dalai	<u>?)</u>
Show:	Draw categories using uni	que values of one field.		Import
Categories Unique values Unique values, many I Match to symbols in a	Value Field Phase2MappingExport.P_STR			
Quantities Charts Multiple Attributes	Symbol Value < <all other="" values=""> <heading> <5%</heading></all>	Label <all other="" values=""> Phase2MappingE <5% >5% <=20% >20%</all>	Count Export.F ? ? ?	

Unique Value in Symbology

Change the symbol for "P2 % straightening" line symbols to the Red lines of varied thicknesses "Straightening <=5%", "Straightening >5% and <=20%" "Straightening >20%" line symbols. Chang the "<Heading>" "P_STRT_RNG" to "RANGE"

If you do not posses FIT data or Phase 2 data, (or you'd like to show how straightening affected all your reaches) use the "P1 % Straightening" data layer, to show the various percentages of straightening within different reaches. This can be done by categorizing by "Unique Value" in "Symbology" and setting the "Value Field" to "STRAI_RNG". Add all relevant values.

ayer Properties	ion Display Symbology Fields	Definition Queru Labels	Joins & Belates]	?
Show: Features Categories	Draw categories using unique	ue values of one field.	Import.	
Unique values Unique values, many I Match to symbols in a	Phase1MappingExport.STRAI_F		Count	-
Quantities Charts Multiple Attributes	<pre><all other="" values=""></all></pre>	<all other="" values=""> Phase1MappingExp < 5%</all>	2 ort. : 54 29	
	>= 5% and < 10% >= 10% and < 20% >= 20%	>= 5% and < 10% >= 10% and < 20% >= 20%	4 6 15	

Unique Value in Symbology

Change the symbol for "P1 % straightening" line symbols to the varied thickness "Straightening <=5%", "Straightening >5% and <=10%", ">10% and <=20%" "Straightening >20%" line symbols.

Chang the "<Heading>" "Phase1MappingExportSTRAI_RNG" to "RANGE"

River Corridor Encroachments Data:

SGAT Feature Type	Attribute Information
FIT line data	Roads, railroads, improved paths, and development
	Phase 1 data indicating highest impact rating (low; high) assessed
OR	between the two parameters: river corridor development (Step
Stream reach – line data	6.2) and berms and roads (Step 6.1).
	Export Code: ENCRCH_IMP

Use the "Encroachment/ Development" data layer to display any lines indicating development or encroachment. This can be done by setting a definition query to Impact = 'Development' or Impact = 'Encroachment' and then Symbolizing the features with a single symbol:

Query Builder	
TRIBID] TRIBID] [PH2SEGID] [PH2SEGID] [PH2SEGID] [PHCHSEGID] [IMPACT] [SUBIMPACT]	
= <> Like 'Bank Armoring or Revetment' > >> And 'Bridge or Culvert' 'Development' 'Encroachment' 'Encroachment' 'Sraightening'	
Is Get Unique Values Go To:	Layer Properties
SELECI ^ FRUM httl1inimpactseg WHERE: [IMPACT] = 'Development' OR [IMPACT] = 'Encroachment'	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
Clear Verify Help Load Save OK Cancel	Show: Draw all features using the same symbol. Import Features Symbol Symbol Categories Quantities Advanced • Multiple Attributes Advanced • Advanced •
Definition Query	Single in Symbology

Change the symbol for the "Encroachment/Development" line to the black and green "Development/encroachment" line symbol.

If the FIT data is not available, use the "P1 Encroachment" data layer to display the impact rating of reaches (assigned in phase 1). Categorize by "Unique Value" by setting the "Value Field" to "ENCRCH_IMP" Add values High" and "Low" (or just the relevant values that exist):

ayer Properties	ion Display Symbology Fields	Definition Query Labels	Joins & Relates
Show: Features Categories Unique values Unique values, many I	Draw categories using unique Value Field Phase1MappingExport.ENCRCH	LIMI	Import
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value <all other="" values=""> High Cow</all>	Label <all other="" values=""> High Low</all>	Count ? ?

Unique Value in Symbology

Change the P1_encroachment line symbols to the Green "P1 encroachment high" and "P1 encroachment low" dotted line symbols. Delete the "<Heading>" "ENCRCH_IMPACT"

Mapping Slope Decreases

Grade controls and Channel Constrictions Data:

SGAT Feature Type	Attribute Information
FIT point	Natural grade control (waterfalls and ledge), human-constructed grade control (dams and weirs), bridge, or culvert (using different symbols for each)
OR Stream segment – line data	Phase 2 data attributing the stream segment line indicating the number of natural or man-made grade controls (Steps 1.6) and channel constrictions with deposition above (Steps 4.8) ($0 \le 2$; $>2 \le 5$; >5)* Export Code: CNSTR_CNTL
	* note: normalized values - # features(5,280)/segment length
OR Stream reach – line data	Phase 1 data attributing the stream reach line indicating the number of natural grade controls (Step 3.2) and bridges or culverts with a high or low impact rating (Step 5.2) ($0 \le 2$; $>2 \le 5$; >5)* Export Code: CNST_CNTL
	* note: normalized values - # features(5,280)/segment length
Stream segment – line	Phase 2 data (Step 4.9) indicating the number of beaver dams
data	$(0 \le 2; >2 \le 5; >5)^*$
uuu	Export Code: BVRDAM_RNG

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	* note: normalized values - # features(5,280)/segment length
Additional Resources:	
Bridge and culvert assessmen	nt – GIS point data, attributed to indicate whether mid-channel
bars have forms in excess to	1/2 bank full height
Vermont Dam Inventory (VC	CGI) – GIS point data indicating the presence of a dam

Use the "Grade Control" data layer to set the definition query to SUBIMPACT = waterfall OR SUBIMPACT = ledge OR SUBIMPACT = dam OR SUBIMPACT = weir.

Query Builder 🛛 🛛 🔀				
[RCHPTID] Image: Constraint of the second seco				
= <> Like Flood Chute' ▲ >> = And Trigation' Ledge' <				
Is Get Unique Values Go To: SELECT * FROM RIOI primpactseg WHERE: [SUBIMPACT] = 'Dam' OR (SUBIMPACT] = 'Ledge' OR [SUBIMPACT] = 'Waterfall'				
Clear Verify Help Load Save OK Cancel				
Definition Orient				

Definition Query

Then use Unique Value in Symbology to show all grade controls. Group the grade control by natural and human-constructed. Hold control button while clicking to select dam and weir. Right click on these and select "Group Values" from the drop down menu. Rename this group "Human Constructed Grade Controls". Repeat these steps for the Ledge and waterfall, renaming them "Natural Grade Controls":



Grouping Unique Value in Symbology

Unique Value in Symbology

Change the "Human Constructed Grade Control" to the Grade Control Human Constructed" symbol and the "Natural Grade Control" to the Grade Control Natural symbol. Delete the "<Heading>" "SUBIMPACT"

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If you do not have FIT data, use the "P2 Grade ctrl/mile" data layer to display the range in number of grade controls per mile in specific reaches/segments. Categorize by "Unique Value". Set the "Value Field" to "CNSTR_CNTL". Add values (<=2), (>2<=5), and (>5):

Layer Properties			?
General Source Select Show:	ion Display Symbology Fields	Definition Query Labels	Joins & Relates
Categories Unique values Unique values, many I	Value Field CNSTR_CNTL	Color Ramp	
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value Call other values> CHeading>	Label <all other="" values=""> CNSTR_CNTL</all>	Count
Representations	<=2 >2 <= 5 > 5	<=2 >2 <= 5 > 5	??

Unique Value in Symbology

Change the "P2 Grade ctrl/mile" line symbols to the various shades of yellow "constrict/mile <=2", "constrict/mile >2 <=5", and "constrict/mile >5", lines. Change the "<Heading>" "CNSTR_CNTL" to "RANGE"

If you do not have FIT data or Phase 2 data, use the "P1 Grade ctrl/mile" data layer to display the range in number of grade controls per mile in specific reaches. Categorize by "Unique Value". Set the "Value Field" to "CNST_CNTRL". Add the values (<=2), (>2<=5), and (>5):

ayer Properties				?
General Source Select	ion Display Symbology Fields	Definition Query Labels -	Joins & Relates	
Show: Features	Draw categories using unique	values of one field.	Imp	ort
Categories Unique values	Value Field CNST_CNTRL	Color Ramp		•
Match to symbols in a Quantities	Symbol Value	Label	Count	
Charts Multiple Attributes	<pre><all other="" values=""> </all></pre> <heading> <=2</heading>	<all other="" values=""> CNSTR_CNTL <=2</all>	2	
	>2 <= 5	>2<=5 >5	? ?	
<				Ŧ

Unique Value in Symbology

Change the "P1 grade ctrl/mile" line symbols to the various shades of yellow "constriction/mile <=2", "constriction/mile >2 <=5", and "constriction/mile >5", lines. Change the "<Heading>" "CNST_CNTRL" to "RANGE"

Beaver Dams:

Use the "Beaver Dam" data layer to show the locations of beaver dams along the river. To do this set the definition query to IMPACT = Beaver Dam. Then Symbolize features with a single symbol:

Query Builder ? 🔀	
[PH2SEGID] [RCHPTID] [RCHSEGID] [MPACT] [SUBINPACT] [LOCATION]	
= <> Like 'Beaver Dam' 'Debris Jam' 'Debris Jam' 'Dredging' 'Flow Regulation' < <= Or 'Grade Control 'Mass Failure'	
Is Get Unique Values Go To:	
SELECT * EBOM fit01 ptimpactseg WHEBE:	Layer Properties 🛛 💽 🗙
IIMPACTI - 'Beaver Dam'	General Source Selection Display Symbology Fields Definition Query Labels Joins & Belates
	Show:
	Features Draw all features using the same symbol.
	Single symbol
	Categories
Clear Verify Help Load Save	Quantities Advanced -
	Multiple Attributes
OK Cancel	
	Legend
Definition Query	Single Symbol in Symbology

Change the "Beaver Dam" point symbol to the pink "Beaver Dam" symbol.

If you do not have FIT data, use the "P2 Beaver dam" data layer to show the ranges of beaver dams per reach/segment. To do this categorize by "Unique Value". Set the "Value Field to $BVRDAM_RNG$ ". Add the values (<=2), (>2 <=5), and (>5):

ayer Properties				? ×
General Source Select Show: Features Categories Unique values Unique values, many I	ion Display Symbology Field: Draw categories using unit Value Field Phase2MappingExport.BVRDA	s Definition Query Labels que values of one field. Color Ramp	s Joins & Relate	Import
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value All other values> (Heading> <=2 2-5 >5	Label <all other="" values=""> range <=2 2-5 >5</all>	Count ? ? ?	1

Unique Value in Symbology

Change the "P2 Beaver dam" line symbols to the various shade of purple "Beaver Dam <=2", "Beaver Dam >2 <=5", and "Beaver Dam >5", lines. Change the "<Heading>" "BVRDAM_RNG" to "RANGE"

Sample Channel Slope Modifiers Map:



Channel Depth Modifier Map

The Channel Depth Modifier map will show stormwater inputs, bridges and culverts, dredging, beaver dams, encroachments, and depositional features.

To keep the map organized we recommend that you create a new data frame for this map.

Select "Insert" \rightarrow "<u>D</u>ata Frame" from the upper menu.

Rename this data frame "Channel Depth Modifier"

Copy and paste all the data layers need for this map.

# of copies	Data
3	Phase1MapTable
4	Phase2MapTable
4	Fit01ptimpactseg
1	Fit011nimpactseg
1	Emergency roads line
1	S05swfinaldslv
1	SubWatershed

Rename the layers in the Channel Depth Modifier Data Frame.



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Mapping Increases in Depth

SGAT Feature Type	Attribute Information			
FIT line data	Berms, Roads, Railroads			
	Phase 2 data (Steps 1.3) indicating the percentage of one bank /			
OR both banks encroached upon by berms, roads, railroads				
Stream segment – line data	gment – line data Export Code: ENCRCH_RNG			
	$(\geq 5 < 20\%; \geq 20\%)$			
OP	Phase 1 data (Step 6.1) indicating low or high impact rating			
Stream reach line data	associated with berms, roads and rail roads			
Sucam reach – Inte data	Export Code: ENCRCH_IMP			

Use the "Encroachment" data layer to display any lines indicating berms, roads, railroads or improved paths. This can be done by setting a definition query to "SUBIMPACT = Berm" OR "SUBIMPACT = Road" OR "SUBIMPACT = Railroad" or "SUBIMPACT = Improved Path". Then symbolize the features with a single symbol:

Query Builder 🤗 🔀	
[TRIBID] Image: Second Se	
= <> Like '' > > = And '' '' '' '' '' () Not '' 'straightening' '' '' '' () Not	Layer Properties 21 X
SELEUT "FRUM httlInimpactseg WHERE: [SUBIMPACT] = 'Berm' OR [SUBIMPACT] = 'Road] Clear Venity Help Load Save OK Cancel	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Show: Features
Definition Query	Single Symbol in Symbology

Change the "Encroachment" line symbol to the brown and black "roads, railroads, berm and improved paths" symbol.

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Connaon	1 mining	map	Ouraunee	repending

If you do not have FIT data, use the "P2 encroachment %" data layer to show the various ranges in percent of encroachments per reach/segment. Categorize by "Unique Value". Set the "Value Field" to "ENCRCH_RNG". Add the values <5%, >5% &<20%, and >20%.

yer Properties	Con-Decamor				?
General Source Selec	tion Displa	ay Symbology Fields	Definition Query Labels	Joins & Relates	
Show: Features	Draw ca	ategories using uniqu	e values of one field.	li	mport
Categories	Value Fie	eld	Color Ramp	18	
Unique values Phase2MappingExport.ENCRCH_RN					•
Match to symbols in a	Symbol	Value	Label	Count	
Quantities Charte		<all other="" values=""></all>	<all other="" values=""></all>		
Multiple Attributes		くHeading> */5%	<u>ر ۲</u> %	2	
	<u> </u>	>5% <=20%	>5% <=20%	2	
		>20%	>20%	?	T

Unique Value in Symbology

Change the "P2 encroachment %" line symbols to the various green yellow orange scale for "P2 encroach <=5%", "P2 encroach >5% <=20%", and "P2 encroach >20%", lines. Change the "<Heading>" "Phase2MappingExport.ENCRCH_RNG" to "RANGE"

If you do not have FIT or Phase 2 data, use the "P1 encroachment impact" data layer to display the phase 1 encroachment impact rating of each reach. Categorize by "Unique Value". Set the "Value Field" to "ENCRCH_IMP". Add the values "High" and "Low".

ayer Properties	l p: 1 Cumbole		?
General Source Select Show: Features Categories Unique values 	On Display Symbolic Draw categories u Value Field Phase1MappingExp	gy Fields Definition Query Lat using unique values of one fiel Color Ram ort.ENCRCH_IMI Color Ram	id. Import Import
Whique values, many l Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value <all other="" v.<br="">High VOV High</all>	Label alues> <all other="" values=""> High Low</all>	Count ? ?

Unique Value in Symbology

Change the "High" line symbol to the light green dotted "P1 encroach High" line symbol and the "Low" line symbol to the dark green dotted "P1 encroach Low" line symbol. Change the "<Heading>" "Phase1MappingExportENCRCH_IMP" to "Rating"

Storm Water Outfalls Data:

SGAT Feature Type	Attribute Information
FIT point data	Storm water discharges – the indexed ditch outlets, culverts, or pipes collecting and conveying stormwater to the segment (or reach)
AND/OR Stream segment - line data	Phase 2 data (Steps 4.6) attributing the segment line to indicate the number of storm water inputs $(0 \le 2; >2 \le 5; >5)^*$ Export Code: STRM_RNG * note: normalized values - # storm water inputs(5,280)/segment length
Additional Resources	
Storm water outfalls inventor municipal planning agency	ories – point data obtained through DEC Storm water Section, regional or

Use the "Stormwater input" data layer to display any points indicating stormwater inputs. This can be done by setting a definition query to IMPACT = 'Stormwater Input'. Then you can symbolize the features with a single symbol:

Query Builder	
[RCHPTID]	
= <> Like 'Flow Regulation' > >> And 'Grade Control' Mass Failure' 'Migration' < <= Or 'Steep Filtie or Head Cu' 'Steep Filtie or Head Cu' ? * () Not 'Stream Crossing'	
Is Get Unique Values Go To:	Layer Properties
SELECT * FROM fit01ptimpactseg WHERE:	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
	Show: Features Traw all features using the same symbol. Import
Clear Verify Help Load Save OK Cancel	Categories Quantities Charts Multiple Attributes
Definition Query	Single Symbol in Symbology

Change the "Stormwater input" point symbol to the green "Stormwater" symbol.

If you do not have FIT data, use the "P2 stormwater/mile" data layer to show the 3 quantity ranges for the number of stormwater inputs per mile for each reach/segment. Categorize by "Unique value". Set the "Value Field" to "STRM_RNG". Add all relevant values.

ayer Properties General Source Select	ion Display Symbology Fields	Definition Query Labels	Joins & Relates	?
Show: Features	Draw categories using uniqu	e values of one field.		mport
Categories Unique values Unique values, many I	Value Field Phase2MappingExport.STRM_R	NG 🗾		•
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value Call other values> <heading></heading>	Label <all other="" values=""> Phase 2 stormwate</all>	Count	-
numpe Attibutes	<=2 >2 <= 5 > 5	<=2 >2 <= 5 > 5	? ? ?	1

Unique Value in Symbology

Change the "P2 stormwater/mile" line symbols to the ramped shades of yellow - red "stormwater/mile <=2", "stormwater/mile >2 <=5", and "stormwater/mile >5", lines. Change the "<Heading>" "Phase2MappingExportSTRM_RNG" to "RANGE"

Bridge and Culvert Data:

Note: older projects (pre 2007) will have line data for bridges and culverts. Before mapping this you will have to convert the line data to point data. This is done in the SGAT project, under the FIT step. See the SGAT user manual for how to modify/remove FIT parameters.

Use the "Bridge or Culvert" data layer to display any points indicating bridge or culverts. This can be done by setting a definition query where "IMPACT = Bridge or Culvert". Then symbolize the features with a single symbol:

Query Builder ? X [DBJECTID] Impaction [IMPACTIO] Impaction [Impaction] Impaction [PCHPTID] Impaction [PCHPTID] Impaction	
	Layer Properties ? General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
Clear Verify Help Load Save OK Cancel	Show: Features Single symbol Categories Quantities Charts Multiple Attributes
Definition Query	Single Symbol in Symbology

Change the "Bridge or Culvert" point symbol to the blue "Bridge/Culvert" symbol.

Corridor Planning Map Guidance Appendix

Mapping Decreases in Depth

Delta and Backwater Deposits Data:

SGAT Feature Type	Attribute Information
FIT data	Impoundments, beaver dams
AND	Phase 2 data (Steps 5.1 and 5.3) indicating the presence the number of steep riffles, mid-channel bars, and delta bars ($0 \le 2$; $>2 < 5$; >5)*
Stream segment – line data	Export Code: DEP_S_RNG * note: normalized values - # features(5,280)/segment length
OR Stream reach – line data	Phase 1 data (Step 5.1, 5.2, 6.3) indicating when low or high impact rating have been made for any of the following: impoundments, bridges and culverts, mid-channel or delta bars. Export Code: DEPTH_DEC
Additional Resources	
Vermont Dam Inventory – G	IS points
Bridge and culvert points fro	m ANR assessments and/or shapefiles created during assessment

Use the "Beaver Dam" data layer to show the locations of beaver dams along the river. To do this set the definition query to "IMPACT = Beaver Dam". Then Symbolize features with a single symbol:

Query Builder	
[PH2SEGID] Image: Constraint of the second sec	
= <> Like 'Beaver Dam' Debis Jam' Debis Jam' Dredging' Flow Regulation' C <= Dr 'Grade Control' 'Mass Failure' 'Mass Failure' 'Migration' 's () Not	
SELECT * FROM fit01 ptimpactseg WHERE:	Layer Properties
[IMPACT] = 'Beaver Dam'	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
×.	Show: Features Show: Draw all features using the same symbol. Import Single symbol Categories Symbol
Clear Verify Help Load Save	Quantities Charts Multiple Attributes Legend
Definition Query	Single Symbol in Symbology

Change the "Beaver Dam" point symbol to the pink "Beaver Dam" symbol.

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Depositional Data:

Use the "P2 deposition/mile" data layer to show the 3 quantity ranges of the number of depositional features (steep riffles, delta bars, and mid channel bars) per mile for each reach/segment. Categorize by "Unique Value". Set the "Value Field" to "DEP_S_RNG". Add all relevant values:

Eatures Categories Unique values Unique values, many	Draw categories using unique Value Field Phase2MappingExport.DEP_RN	G Values of one field	I. Imp	ort
Match to symbols in a Quantities	Symbol Value	Label	Count	
Charts	<pre></pre>	<aii other="" values=""></aii>		
Autopie Attributes	▲ ▲ ▲ <=2	<=2	?	
	>2<=5	>2 <= 5	?	-
	••••>5	>5	?	
	Add All Values Add Values	Remove Re	emove All Adva <u>n</u> c	ed •

Unique Value in Symbology

Change the "P2 deposition/mile" line symbols to the triangle, square, and circle "deposition /mile <=2", "deposition/mile >2 <=5", and "deposition/mile >5", lines. Change the "<Heading>" "DEP_S_RNG" to "RANGE"

If you do not have phase 2 data, use the "P1 deposition impact" data layer to show the deposition impact score for the entire reach. Categorize by "Unique Value". Set the "Value Field" to "DEPTH_DEC". Add all relevant values:

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Gravel Mining and Bar Scalping Data:

SGAT Feature Type	Attribute Information
FIT point data	Dredging, gravel mining, or bar scalping
OR Stream segment – line data	Phase 2 data (Step 5.5) indicating the presence of dredging, gravel mining, or bar scalping Export Code: DREDGING
AND/OR Stream reach – line data	Phase 1 (Step 5.5 data) indicating low or high impact rating associated gravel mining and dredging Export Code: I_DREDGE

Use the "Dredging" data layer to display any points indicating dredging, gravel mining or bar scalping. To do this set the definition query to Impact = 'Dredging" OR IMPACT = 'Gravel' OR IMPACT = 'Mining' OR IMPACT =, 'Bar Scalping'. Symbolize features with a single symbol:

Query Builder ? 🔀	
[TRIBD] Image: Second Sec	
= <> Like Beaver Dam' >> And Dredging' C <=	
SELECT * EPOM @01etimpactors 1//HEPE:	Layer Properties
[IMPACT] = 'Dredging'	General Source Selection Divolate Sumboling Fields Definition Query Labels Loine & Belates
Clear Verify Help Load Save OK Cancel	Show: Draw all features using the same symbol Import Features Oraw all features using the same symbol. Import Categories Quantities Symbol Charts Multiple Attributes Advagced

Definition Query

Single Symbol in Symbology

Change the "Dredging" point symbol to the shovel "Dredging" symbol.

If you do not have FIT data, use the "P2 Dredging" data layer to display weather or not a reach/segment has been dredged. Categorize by "Unique Value". Set the "Value Field" to "DREDGING". Add the value "Yes":

General Source Select	ion Display Symbology Fields	Definition Query Labels	Joins & Relates
how: Features	Draw categories using uniqu	e values of one field.	Import
Categories	Value Field	Color Ramp	
<mark>Unique values</mark> Unique values, many l	Phase2MappingExport.DREDGI		· · · · ·
Match to symbols in a	Symbol Value	Label	Count
Quanddes Charts	<all other="" values=""></all>	<all other="" values=""></all>	
Multiple Attributes	🖌 🖌 🖌 Yes	Yes	?

Unique Value in Symbology

Change the "P2 Dredging" line symbols to the yellow "Dredging Yes" line symbol. Delete the "<Heading>" "Phase2MappingExportDREDGING"

If you do not have FIT or Phase 2 data, use the "P1 dredging impact" data layer to show if the impact rating for the dredging of each reach is high, low or insignificant. Categorize by "Unique Value". Set the "Value Field" to "I_DREDGE". Add all the value relevant values:

Layer Properties				? ×
General Source Select	ion Display Symbology Fields	Definition Query Labels	Joins & Relates	1
Features	Draw categories using uniqu	e values of one field.		Import
Categories Unique values Unique values, many I Match to symbols in a	Value Field Phase1MappingExport.I_DREDG	E		-
Quantities	Symbol Value	Label	Count	
Charts	All other values>	<all other="" values=""></all>	100	
Multiple Attributes	high	high	?	
	Low	Low	?	1

Unique Value in Symbology

Change the line symbols to the thick yellow "P1 dredge high" and the thinner yellow "P1 dredge low" symbol

Delete the <Heading> "Phase1MappingExport.I_DREDGE".

Sample Channel Depth Modifiers Map:



Boundary Conditions and Riparian Modifiers Map

The Boundary Conditions and Riparian Modifiers map will show areas where the vegetation buffers are less than 25 feet, the bank is composed of cohesive material, stream bed material, grade controls, bank armoring, bank erosion, and dredging.

To keep the map organized we recommend that you create a new data frame for this map. Select "Insert" \rightarrow "Data Frame" from the upper menu Rename this data frame "Boundary Conditions and Riparian Modifiers" Copy and paste all the data layers need for this map.
# of copies	Data
2	Phase1MapTable
8	Phase2MapTable
2	Fit01ptimpactseg
3	Fit011nimpactseg
1	S15WR emergency roads line
1	S05swfinaldslv
1	SubWatershed

Rename the layers in the Boundary Condition and Riparian Modifiers Data Frame



Mapping Increased Boundary Resistance

SGAT Feature Type	Attribute Information		
FIT line data	Buffer less than 25 feet		
OR Stream segment – line data	Phase 2 data (Step 3.2) attributed to lines offset right and left of the stream segment line indicating whether the 0-25 ft buffer category is the dominant buffer types within reach / segment (indicate separately for right or left bank). Export Code: L_BUFF_25 & R_BUFF_25		
OR Stream reach – line data	Phase 1 data (Step 4.3) attributed to lines offset right and left of the stream segment line indicating whether the dominant right and left bank buffer category within reach / segment is less than ≤ 25 ft. Export Code: L_NO_BUFF & R_NO_BUFF		
AND Stream segment – line data	Phase 2 data (Step 3.1) attributed to the stream segment line indicating whether the right or left lower bank materials where comprised of cohesive materials. Export Code: COHESIVE		

To show the exact location of areas where the vegetation buffer is less than 25 feet use the "Buffer less 25" data layer and set a definition query so that "IMPACT = Buffer Less than 25". Categorize by "Unique Value" set the "Value Field" to "LOCATION". Add the values right bank and left bank.

Note: Projects done prior to 2007 may not have FIT data for buffers less than 25ft. This parameter was added in 2007 stream assessments.

Query Builder		
"IMPACTID" "FRIBD" "PH2SEGID" "RCHPFID" "RCHSEGID" "IMPACT"		
= <> Like 'Bank Armoning or Revetment' > >= And 'Bridge or Culvert' > >= And 'Encroachment' < <= Dr 'Encroachment' 'Straightening' 'Straightening' 'Straightening'		
_ % () Not	Layer Properties	<u>?×</u>
Is Get Unique Values Go To:	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates	
SELECT * FROM fit01Inimpactseg WHERE:	Show: Draw categories using unique values of one field. Import.	
'IMPACT'' = 'Buffers Less than 25'	Categories Unique values Uniqu	-
	Quantities Symbol Value Label Count	
Clear Verify Help Load Save	Charts (Heading) (All other values) (All other valu	
OK Cancel	Left Bank Left Bank ? Right Bank Right Bank ?	
Definition Query	Unique Value in Symbology	

Change the "Buffer less 25" line symbols to the grey and green "L Buff 25 yes" and "R Buff 25 yes" line symbols

If you do not have FIT data, this will be done for both the left and right buffers. For the left buffer use the "P2 L Buffer25" data layer to show the left bank locations where the dominant width of buffer is less than 25ft. Categorize by "Unique Value". Set the "Value Field" to "L_BUFF_25". Add the value "Yes".

ayer Properties General Source Select	ion Display Symbology Fields	Definition Query Labels	Joins & Relates
Show: Features	Draw categories using uniqu	ue values of one field.	Import
Categories Unique values Unique values, many l Match to symbols in a Quantities Charts	Value Field Phase2MappingExport.L_BUFF_	25 💌	<u> </u>
	Symbol Value <all other="" values=""> <heading></heading></all>	Label <all other="" values=""></all>	Count
maiche Attinutes	Yes	Yes	?

Unique Value in Symbology

Change the "L Bank Buffer 25" line symbol to the green and grey "L Buff 25 yes" line. Change the "<Heading>" "L_BUF_25" to "<25ft".

For the right buffer, use the "P2_R_Buffer25" data layer to display whether the reach has less than a 25 foot buffer for any part of the right bank. Categorize by "Unique Value". Set the "Value Field" to "R_BUFF_25". Add the value "Yes".

ayer Properties			<u>? ×</u>
General Source Select	ion Display Symbology Fields	Definition Query Labels Jo	ins & Relates
Features Categories Unique values Unique values, many I	Value Field Phase2MappingExport.R_BUFF_	25	
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value Symbol Value <all other="" values=""> <heading> Yes</heading></all>	Label <all other="" values=""> is the buffer <25ft? Yes</all>	Count ?
			1

Unique Value in Symbology

Change the "R Bank Buffer 25" line symbol to the green and grey "R Buff 25 yes" line. Change the "<Heading>" "R_BUF_25" to "<25ft"

If you do not have FIT or Phase 2 data, this will be done for both the left and right buffers. For the left buffer use the "P1 L Buffer" data layer to display whether the reach has less than a 25 foot buffer for any part of the right bank. Categorize by "Unique Value". Set the "Value Field" to "L_NO_BUFF". Add the value "Yes".

ayer Properties General Source Selecti	on Display Symbology Fields	Definition Query Labels Jo	ins & Relates
Show: Features	Draw categories using uniqu	ue values of one field.	Import
Categories 	Value Field Phase1MappingExport.R_NO_B		
Match to symbols in a	Symbol Value	Label	Count
Charts Multiple Attributes	<pre> <all other="" values=""> <heading> Yes</heading></all></pre>	<all other="" values=""> is the buffer <25ft? Yes</all>	?

Unique Value in Symbology

Change the "P1 R Buffer" line symbol to the green and brown "R Buff 25 yes" line. Change the "<Heading>" "R_NO_BUFF" to "<25ft" For the right buffer, use the "P1 R Buffer" data layer to display the percent of the reach that has no buffer for the left bank. Categorize by "Unique Value". Set the "Value Field" to "R_NO_BUFF". Add all relevant values.

ayer Properties				<u>?</u> ×
General Source Select	on Display Symbology Fields	Definition Query Labels Jo	ins & Relates	
Show: Features	Draw categories using uniqu	e values of one field.	Im	port
Categories Unique values Unique values, many I	Value Field Phase1MappingExport.L_NO_BI	JFF		•
Match to symbols in a	Symbol Value	Label	Count	
Charts Multiple Attributes	<pre> <all other="" values=""></all></pre>	<all other="" values=""> is the buffer <25ft? Yes</all>	?	
	l			

Unique Value in Symbology

Change the "P1_L_Buffer" line symbol to the green and brown "L Buff 25 yes" line. Change the "<Heading>" "L_NO_BUFF" to "RANGE"

Use the "P2 Cohesive bank" data layer to show if the banks of the reach/segment are made of cohesive materials. To do this set the Definition query to "COHESIVE" = "Yes" and then display using a single symbol.

Layer Propertie	Query Builder	2 🛛	
General Source	[L_BUF_25]	<u> </u>	
Definition Query:	[R_BUF_25] [BED_MATER]		
	[COURSE_BED] [COHESIVE]	-	
	[L_REVT_RNG]	~	
	= <> Like NULL		
	> >= And Yes'		
	? * () Not	_	
	Is Get Unique Values Go To:		Layer Properties
Query Bui	SELECT * FROM Phase2NewTable WHERE:		General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates
	[CDHESIVE] = 'Yes'	<u>~</u>	Show: Features Draw all features using the same symbol. In
			Single symbol
			Categories Ovincei
			Charts Advanced -
	HelpLoad	save	Multiple Attributes
	OK	Cancel	Legend
	Definition Query		Single Symbol in Symbology

Change the default "P2 Cohesive bank" line symbol to the black and green "cohesive bank" line symbol.

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Grade Controls Data:

SGAT Feature Type	Attribute Information			
FIT point and line data	Natural grade control (waterfalls and ledge) and human-constructed grade control (dams and weirs) (using different symbols for each)			
AND Stream segment – line data	Phase 2 data (Step 2.12) indicating the bed substrate (D50) is equal to or greater than the course gravel substrate size.Export Code: COURSE_BED			
Additional Resources				
Vermont Dam Inventory (VCGI) – GIS point data indicating the presence of a dam				

Use the "Grade Control" data layer to show the number and location of the grade controls for the entire river. To do this set the definition query where "SUBIMPACT = waterfall" or "SUBIMPACT = ledge" OR "SUBIMPACT = dam" OR "SUBIMPACT = weir". Then use Unique Value in Symbology to show all grade controls. Group the grade control by natural and human-constructed:



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Vermont Agency of Natural Resources

Unique Value in Symbology

Change the "Grade Control" point symbols to the blue and grey "natural grade control" and "human constructed grade control" symbols.

Change the value title "Dam; Weir" to "Human-Constructed Grade Controls" and the value title "Ledge; Waterfall" to "Natural Grade Control"

Delete the "<Heading>" "SUBIMPACT"

Substrate Data:

Use the "P2 Coarse Bed" data layer to indicate which segments/reaches have bed substrate that is equal to or greater than the course gravel substrate size. To do this use the query builder to select only those reach/segments that have "COURSE_BED = Yes". Then display using a Single Symbol:



Definition Query

Single Symbol in Symbology

Change the "P2 Coarse bed" line symbol to the teal "Coarse bed material" line symbol.

Bank Armoring and Active Bank Erosion Data:

SGAT Feature Type	Attribute Information
FIT line data	Bank armoring/revetment or erosion attributed separately (off-set
I'II lille data	for right and/or left bank separately)
	Phase 2 data (Steps 3.1) indicating the percentage of the reach /
	segment length (right and left bank) with bank revetment and
OR	eroding (\geq 5 <20%; \geq 20%) (using separate symbols for
Stream segment – line data	revetment and erosion)
	Export Code: L_EROS_RNG & R_EROS_RNG
	Export Code: L_REVT_RNG & R_REVT_RNG

Use the Armoring data layer to display bank armoring locations along the stream. Set the definition query to "IMPACT = Bank Armoring or Revetment" and then categorize by unique value. Set the "Value Field" to "LOCATION". Add all relevant values to determine which side of the reach/segment the armoring occurred on.



Definition Query

Unique Value in Symbology

Change the "Armoring" line symbols to the blue "Armoring right bank" and "Armoring left bank" line symbols.

Delete the <Heading> "LOCATION"

If you do not have FIT data, this will be done for both the left and right revetments. For the left revetments use the "P2 L Revetment %" data layer to display the percent of each reach/segment that is lined with left bank revetments. Categorize by "Unique Value". Set the "Value Field" to "L_REV_RNG". Add all relevant values.

ayer Properties	ion Displa	v Symbology Fields	Definition Query Labels	Joins & Belati	?) es]
Show: Features Categories Unique values	Draw ca Value Fie Phase2M	Itegories using unique Id MappingExport.L_REVT	Le values of one field.		Import
Match to symbols in a Quantities Charts Multiple Attributes	Symbol	Value <all other="" values=""> <heading></heading> <5% >20% >5% <=20%</all>	Label <all other="" values=""> range <5% >20% >5% <=20%</all>	Count ? ? ?	T 1

Unique Value in Symbology

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Connaon	1 14111119	m	Garaditee	- pponom

Change the grade "P2 L Revetment%" line symbols to the various shades of blue "Revetment <=5%", "Revetment >5% <20%", and "Revetment >20%", lines. Change the "<Heading>" "L_REVT_RNG" to "RANGE"

For the right revetments, use the "P2 R Revetment %" data layer to display the percent of each reach/segment that is lined with right bank revetments. Categorize by "Unique Value". Set the "Value Field" to "R_REV_RNG". Add all relevant values.

ayer Properties					<u>?</u> ×
General Source Select	ion Displa	ay Symbology Fields	Definition Query Labels	Joins & Relate	es
Show: Features	Draw ca	ategories using uniqu	ue values of one field.		Import
Categories — Unique values — Unique values, many I	Value Fie Phase2	eld MappingExport.R_REVT	_RN Color Ramp		•
Match to symbols in a	Symbol	Value	Label	Count	
Charts Multiple Attributes		<all other="" values=""> <heading></heading></all>	<all other="" values=""> range</all>		
Multiple Attributes		<5% >5% <=20%	<5% >5% <=20%	?	
		>20%	>20%	?	1

Unique Value in Symbology

Change the grade "P2 R Revetment%" line symbols to the various shades of blue "Revetment <=5%", "Revetment >5% <20%", and "Revetment >20%", lines. Change the "<Heading>" "R_REVT_RNG" to "RANGE"

Erosion Data:

Use the "Erosion" data layer to display the erosion locations for the entire stream. Set the definition query to "IMPACT = Erosion". Categorize by "Unique Value". Set the "Value Field" to "LOCATION". Add right and left.

Layer Propertie General Source Definition Query. [IMPACT] = 'Bar	Query Builder Image: Constraint of the second sec	Layer Properties	
Query Bui	< <= Dr Enclosement ? * () Not Straightening' Is Get Unique Values Go To: SELECT * FROM R01Inimpactseg WHERE:	General Source Selection Display Symbology Fields Definition Query Labels J Show: Features Categories Unique values Unique values, many I Color Ramp LOCATION	oins & Relates Im
a 	Clear Verify Help Load Save OK Cancel	Quantities Symbol Value Label Charts Multiple Attributes Left Bank Left Bank Left Bank Right Bank Right Bank	Count ? ?
	Definition Query	Unique Value in Symbology	

Change the "Erosion" line symbols to the brown "Erosion left bank" and "Erosion right bank" line symbols

Delete the "<Heading>" "LOCATION"

If you do not have the FIT data, this will be done for both the left and right erosion. For the left erosion use the "P2 L Erosion %" data layer to display the left bank erosion range for each reach/segment. Categorize by "Unique Value". Set the "Value Field" to "L_EROS_RNG". Add all relevant values.

ayer Properties				? >
General Source Select Show: Features	ion Display Symbology Fie Draw categories using u	elds Definition Query Labels	s Joins & Relat	es
Categories Unique values Unique values, many I Match to symbols in a	Phase2MappingExport.L_EF		- Crumb	
Quantities Charts Multiple Attributes	<pre></pre>	<pre><all other="" values=""> range <5% </all></pre>	?	
	>5% <=20%	>5% <=20% >20%	?	1

Unique Value in Symbology

Change the "P2 L Erosion%" line symbols to the various shades of brown "erosion <5%", "erosion >5% <=20%", and "erosion >20%", lines. Change the "<Heading>" "L_EROS_RNG" to "RANGE" For the right erosion, use the "P2 R Erosion %" data layer to display the right bank erosion range. Categorize by "Unique Value". Set the "Value Field" to R_EROS_RNG". Add all relevant data.

ayer Properties				<u>?</u> >
General Source Select Show: Features Categories 	on Display Symbology Field Draw categories using unit Value Field Phase2MappingExport.R_ERC	s Definition Query Labels que values of one field. DS_RN	s Joins & Relate	es Import
Match to symbols in a Quantities Charts Multiple Attributes	Symbol Value <all other="" values=""> <heading> <5% >5% <=20% >20% >20%</heading></all>	Label <all other="" values=""> range <5% >5% <=20% >20%</all>	Count ? ? ?	

Unique Value in Symbology

Change the "P2 R Erosion%" line symbols to the various shades of brown "erosion <5%", "erosion >5% <=20%", and "erosion >20%", lines. Change the "<Heading>" "R_EROS_RNG" to "RANGE"

Historic Dredging and Windrowing Data:

SGAT Feature Type	Attribute Information
FIT point data	Dredging, gravel mining, or bar scalping
AND/OR	Phase 1 data (Step 5.5) indicating low or high impact rating
Stream reach – line data	associated gravel mining and dredging
	Export Code: I_DREDGE

Use the "Dredging" data layer to display the locations of dredging along the entire river. To do this, set the definition query to IMPACT = 'Dredging', 'Gravel Mining' or 'Bar Scalping' and then display using a single symbol:

Layer Propertie Query Builder		
General Source [FICRESCID] Definition Quey: [SUBIMPACT] SUBIMPACT] = <> Li > >= Ar < < = □ 2 * () N	e Flow Regulation' G Gade Control Mass Falue' Mayaion' Steep Fille or Head Cu' Steep Fille or Head Cu' Steep Stell or thead Cu' Steep Stell or thead Cu' Steep Stell or thead Cu'	Layer Properties
Query Bui [MPACT] = 'Dredgin	Get Unique Values Go To: primpactseg WHERE:	General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Show: Features Draw all features using the same symbol. Import
5 Clear Vr	rily Help Load Save OK Cancel	Symbol Categories Quantities Charts Multiple Attributes
		Cin ale annuh al in Counth ale an

Definition Query

Single symbol in Symbology

Change the default "Dredging" point symbol to the shovel "Dredging" symbol

Sample Boundary Conditions and Riparian Modifiers Map:



Sediment Regime Departure Map

The Sediment Regime Departure Map is actually divided into 2 maps, one depicting reference conditions and one depicting existing conditions. Both maps should have ortho photos as a base and display parcel boundaries, if available.

Phase 1 Sediment Regime Departure -Reference Condition Map

The Sediment Regime Departure Reference Conditions map will show natural grade controls and existing sediment types. This map is created to show what the river would be like without human influence.

To keep the map organized we recommend that you create a new data frame for this map.

Select "Insert" \rightarrow "<u>D</u>ata Frame" from the upper menu

Rename this data frame "Sediment Regime Reference"

Copy and paste all the data layers need for this map.

# of copies	Data
1	Fit01ptimpactseg
1	S09corridor
1	Emergency roads line
1	S05swfinaldslv
1	SubWatershed
-	NAIP

Rename the layers in the Sediment Regime Reference Data Frame.



Mapping Sediment Regime Data:

Use the "P1 Sediment" data layer to show the sediment regime of each segment/reach. Symbolize by "Unique Value". Set the "Value Field" to "Phase1MappingExport.PH1_SED_RE". Add all relevant values.

Show:		que values of one field		+
Features Categories — Unique values — Unique values, many	Value Field Phase1MappingExport.PH1_S	ED_RI		_
Match to symbols in a	Symbol Value	Label	Count	
Quantities Charts	All other values>	<all other="" values=""></all>		
	l (Heading)	Phase1MappingExpo	it.ł	
Multiple Attributes	T	Transport	2	
Multiple Attributes		Transport Confined Source and Tra	? nst?	
Multiple Attributes		Transport Confined Source and Tra Unconfined source and tr	? nsp? an:?	1
Multiple Attributes	T CST UST FSTCD	Transport Confined Source and Tra Unconfined source and tr Fine Source and Transpo	? nsp:? an:? nt_!?	1

Unique Value in Symbology

Change the "P1 Sediment" polygon fill symbols to the blue, yellow, orange, red, and green for "T", "CST", "UST", "FSTCD" and "CEFD" fills.

Change the "<Heading>" "PH1_SED_REG" to "TYPE"

Change the "T" title to "Transport"

Change the "CST" title to "Confined Source and Transport"

Change the "UST" title to "Unconfined Source and Transport"

Change the "FSTCD" title to "Fine Source and Transport & Coarse Deposition"

Change the "CEFD" title to "Coarse Equilibrium (in = out) & Fine Deposition"

Mapping Grade Control Data:

1) Use the "Natural Grade Ctrls" data layer to display Vertical Constraints along the whole river. To do this, set the definition query to SUBIMPACT = waterfall OR SUBIMPACT = ledge. Then symbolize with a single symbol.

Query Builder ? × "TRIBID" • "PH2SEGID" • "RCHPEID" • "RCHSEGID" • "MPACT" •	
= <> Like 'Gravel Mining' ▲ > > = And 'Head Cut' Ledge' 'Ledge' 'Neck Cutoff' 'Steep Riffle' 'Steep Riffle' 'Steep Riffle' % () Not 'Waterfall' ▼ Is Get Unique Values Go To:	
SELECT * FROM fit00ptimpact WHERE: "SUBIMPACT" = 'Ledge' OR "SUBIMPACT" = 'Waterfall'	Caper Properties ? × General Source Selection Display Symbology Fields Definition Query Labels Joins & Relates Show: Features Draw all features using the same symbol. Import
Clear Verify Help Load Save	Categories Quantities Charts Multiple Attributes

Definition Query

Single Symbol in Symbology

Change the "Natural Grade Ctrls" point symbol to the blue and gray "Natural Grade Control" symbol.

Phase 2 Sediment Regime Departure -Existing condition Map

The Sediment Regime Departure Existing Conditions map will show all grade controls, existing sediment types, and a buffered corridor development layer.

To keep the map organized we recommend that you create a new data frame for this map.

Select "Insert" \rightarrow "Data Frame" from the upper menu

Rename this data frame "Sediment Regime Existing"

Copy and paste all the data layers need for this map.

# of copies	Data
1	Fit01ptimpact
1	Phase 2 Corridor
1	S15WR emergency roads line
1	Emergency ESITE Point
1	Emergency DW Line
1	S05swfinaldslv
1	SubWatershed
-	NAIP
-	Parcels

Rename the layers in the Sediment Regime Existing Data Frame.



Mapping Sediment Regime Data:

1) Use the "P2 Sediment" data layer to show the field verified sediment regime types for each segment/reach. Categorize by "Unique Value". Set the "Value Field" to "Phase2MappingExport.PH2_SED_R". Add all relevant values.

Layer Properties					? ×
General Source Selecti Show: Features Categories 	on Displa Draw ca Value Fin Phase2	ay Symbology Fields ategories using unique eld MappingExport.PH2_SED	Definition Query Labels Join values of one field. Color Ramp	ns & Relate	Import
United Symbols in a Quantities	Symbol	Value <all other="" values=""></all>	Label <all other="" values=""></all>	Count	
Multiple Attributes		<heading> T CST UST FSTCD CEFD</heading>	Type Transport Confined source and Trans Unconfined source and Tra Fine Source and Transport Coarse Equilibrium (in = out	? p? ar? _!?),?	↑ ↓

Unique Value in Symbology

Change the "P2 Sediment" polygon fill symbols to the blue, yellow, orange, red, and green for "T", "CST", "UST", "FSTCD" and "CEFD" fills.

Change the "<**Heading**>" "**PH2_SED_R**" to "**TYPE**"

Change the "T" title to "Transport"

Change the "CST" title to "Confined Source and Transport"

Change the "UST" title to "Unconfined Source and Transport"

Change the "FSTCD" title to "Fine Source and Transport & Coarse Deposition"

Change the "CEFD" title to "Coarse Equilibrium (in = out) & Fine Deposition"

Mapping Grade Control Data:

To display Vertical Constraints for the river use the "Grade Ctrls" data layer. To do this set the definition query to 'SUBIMPACT' = waterfall, or 'SUBIMPACT' = ledge OR 'SUBIMPACT' = dam OR 'SUBIMPACT' = weir. Categorize by "Unique Value". Set the "Value Field" to "SUBIMPACT" Add all relevant data. Group the grade control by natural and human-constructed:

Query Builder	?×					
[RCHPTID] [RCHSEGID] [IMPACT] [SUBIMPACT] [LOCATION] [DATE_]						
= <> Like 'Flood Chute' 'Head Cut' 'Irigation' 'Ledge' < <= Or 'Steep Riffle'		Layer Properties				?
? * () Not 'Stream Ford' ? * () Not Waterfall' Is Get Unique Values Go To: SELECT * EBDM @01ntimeschese WHERE:		General Source Select Show: Features Categories	ion Disp Draw c Value F	lay Symbology Fields ategories using uniqu ield	Definition Query Labels Joins & Rela e values of one field.	Import
[SUBIMPACT] = 'Dam' OR [SUBIMPACT] = 'Ledge' OR [SUBIMPACT] = 'Waterfall'		Grindue values Grindue values, many I Grindue values, many I	Symbol	Value	Label Count (all other values)	
	~	Multiple Attributes		<heading></heading>	SUBIMPACT	
Clear Verify Help Load S	ave			Dam	Human-Constructed Grade (?	
	ancel			Ledge; Waterfall	Natural Grade Control ?	
		< >>>				-
Definition Query			Unic	que Value in	Symbology	

Change the "Grade Ctrls" point symbols to the blue and grey "natural grade control" and "human constructed grade control" symbols.

Change the value title "Dam; Weir" to "Human-Constructed Grade Controls" and the value title "Ledge; Waterfall" to "Natural Grade Control"

Delete the "<Heading>" "SUBIMPACT"

Mapping Lateral Constraints:

To map Lateral Constraints, begin with "Roads", "Driveway", and "Buildings" data layers (Note: Only select Buildings data that indicates a building, not a pay phone or hydrant.). We

only want to see the features that falls within the river corridor (P2 Sediment). To do this open ArcToolbox by clicking on the red toolbox icon in the top center of the ArcMap display. Navigate within the tool box to the "Clip" tool.



Double click on the "Clip" tool to open the "Clip" window. You must clip each of the above mentioned, one at a time. First select the "Buildings" data layer from "Input Features" drop down menu.

🥕 Clip		
	Input Features	-
	🖉 buildings 🗾 🖾	
	 Grade ctris P2 sediment 	,
	🖉 🖉 buildings]
	✓ unverway ✓ castleton river	,
	✓ roads	

Now select the polygon filed "P2 sediment" that you will "Clip Features" to. Select where you would like the file saved (Output Feature Class) and what you would like to name it (the default name will work). When you have selected all these options, click "OK"

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🥕 Clip	
	Input Features
	🖉 buildings
	Clip Features
	P2 sediment
	Output Feature Class C:\Documents and Settings\junior\Desktop\ch 5GIS\building
	Cluster Tolerance (optional)
	OK Cancel Environments Show Help >>

This will trigger a dialog showing the status of the clipping.

- Lip	×
Completed	Cancel
	<< Details
Close this dialog when completed successfully	
Start Time: Sat Nov 03 00:31:53	2007 🔺
Executed (Clip_1) successfully.	
End Time: Sat Nov 03 00:31:56 20	107
(Elapsed Time: 3.00 seconds)	
	-

Repeat the above steps for the clipping of the "Roads" and "driveway" data layers. If the shapefiles you created have not automatically been added you will need to add all 3 of the newly created shapefiles.

Now we are going to create a buffer around these newly added shape files. To do this, navigate to the "buffer" tool within the ArcToolbox.

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Like clipping, the Buffer tool must be run separately for each layer.

Double click on the "Buffer" tool to open the "Buffer" window.

Select the newly created building shape file, "Building clip", from the "Input Features" drop down menu.

Select where you would like this saved and what you would like to name it.

Set the "Distance [value or field]" to "166" and choose "Feet" from the units drop down menu. Click the "OK" button.

🥕 Buffer		
	Input Features	_
	🖉 building clip	
	Output Feature Class	
	C:\Documents and Settings\junior\Desktop\ch 5GIS\building	
	Distance [value or field]	
	166 Feet	
	C Field	
	<u> </u>	
	Side Type (optional) FULL	
	End Type (optional) ROUND	
	Dissolve Type (optional)	<u>-</u>
	OK Cancel Environments Show	w Help >>

Repeat these steps to buffer the clipped "Roads" and clipped "driveways", but for these, you must use a "Linear unit" of "50" "Feet".

🥕 Buffer			_ 🗆 ×
Input Features			^
<pre>emergency_rds_line_Clip</pre>	×		
Output Feature Class			
C:\arcgis\vermont\roads vt\ES	911 RDS\emergency_rds_line_	ĕ	
Distance [value or field]			
Unear unit	Feet 🔻		
O Field			
	_		
Side Type (optional)			
JULL			
End Type (optional) ROUND	.		
Dissolve Type (optional)	_		-
,	OK Cano	el Environments SI	how Help >>

It is helpful to merge all of the buffered data into one data layer and call it Lateral Constraints. To do this, navigate to the merge tool within ArcToolbox:



Double click on the "Merge" tool, to open the "Merge" window.

Use the "Input Features" drop down menu to select the 3 buffered data layers. Once you have selected (highlighted) one click on the Plus button to add it to the list.

Once all three are on the list, choose the location where you would like this file saved. Rename the File "Lateral Constraints".

i Merge		×
	Input Features	Ē
	buildingclip_Buffer drivewayClip_Buffer emergency_rds_line_Clip_Buff t	
	Output Features C:\Documents and Settings\junior\Desktop\ch 5GIS\Lateral Field Map (optional) The AREA (Double)	•
	OK Cancel Environments Show Help >	>

When you have done this, click "OK" Add the "Lateral constraints" shapefile to the map.

ayer Properties		?:
General Source Selec	tion Display Symbology Fields Definition Query Labels Jo	oins & Relates
Show: Features	Draw all features using the same symbol.	Import
Categories Quantities	Symbol	
Charts Multiple Attributes		

Single Symbol in Symbology

Change the "Lateral Constraints" polygon fill to the yellow "Lateral Const" fill.

Sample Sediment Regime Departure Map:



Existing

Reference

Stream Sensitivity Map

The stream sensitivity map will show sensitivity rating, aggradation and degradation history. To keep the map organized we recommend that you create a new data frame for this map. Select "Insert" \rightarrow "Data Frame" from the upper menu Rename this data frame "Stream Sensitivity" Copy and paste all the data layers need for this map.

# of copies	Data
2	Phase_2_Corridor
1	Emergency roads line
1	S05swfinaldslv
1	SubWatershed

Rename the layers in the Stream Sensitivity Data Frame.



Mapping the Sensitivity Rating Data:

SGAT Feature Type	Attribute Information		
Stream segment corridor -	Phase 2 (step 7.7) – indicating the stream sensitivity		
polygon	* note: the corridor must be segmented if the Phase 2 reach was		
	segmented prior to attributing Phase 2 data to it.		
	Export Code: STR_SENSIT		
Stream segment corridor –	Phase 2 (Step 7.1 and 7.2) – separately indicating if the channel		
polygon	adjustments of degradation or aggradation are major adjustments (fair or		
	poor conditions – scores of 1-5 are poor, $6 - 10$ are fair) and the		
	adjustment is current (i.e., the "historic" box is not checked.		
	Export Code: VERT_DEG ; VERT_AGG		

Use the "Sensitivity" data layer to display the Phase 2 sensitivity rating assigned to each segment/reach. Categorize by "Unique Value". Set the "Value Field" to "Phase2MappingExport.STR_SENSIT". Add all relevant values.

Layer Properties				?
General Source Select	ion Display Symbology Field	ls Definition Query Labels	Joins & Relates	
Show: Features	Draw categories using uni	que values of one field.	lr	nport
Categories Unique values Unique values, many I	Value Field Phase2MappingExport.STR_S	SENSI1		
Match to symbols in a Quantities Charts	Symbol Value Symbol Value Image: Contract of the symbol Contract of the symbol	Label Corridor	Count	-
Multiple Attributes	Very Low Moderate	Very Low Moderate	? ?	4
<	High Very High Extreme	High Very High Extreme	? ? ?	

Unique Value in Symbology

Change the "Sensitivity" polygon symbols to the blue, yellow, peach, orange and red shaded fills symbols for "Very Low", "Low", "Moderate", "High", "Very High", and "Extreme", respectively.

Change the "<Heading>" "STR_SENSIT" to "LEVEL"

Mapping the Current Vertical and Lateral Adjustments Data:

Use the "Aggradation vs. Degradation" data layer to display vertical adjustments. To do this first develop a definition query that identifies if a reach/segment has not had historic adjustment. Use DEGRD_HIST = 'No' and AGGRD_HIST = 'No':

Query B	uilder				? ×
"Phase "Phase "Phase "Phase "Phase "Phase	e_2_corri e_2_corri e_2_corri e_2_corri e2Mappir e2Mappir	dor.FID" dor.RCHP dor.TRIBIE dor.CORD ngExport.O	TID")" RAREA" ID" BOJECTID"		
	<> >= <=	Like And Or			
Is SELECT ''Phase ''Phase	 [× FROM 2Mappin 2Mappin	1 Phase_2 gExport.DF gExport.AC	Get Unique Va _corridor_Phase EGRD_HIST'' = GGRD_HIST'' =	alues Go To: 2MappingExpor 'No'AND 'No'	WHERE:
Cle	ar _	Verify	Help	Load OK	Save Cancel

Definition Query

Categorize by "Unique Value". Set on field to "Value Field", one to "Phas2MappingExport.VERT_DEG" and another as "Phase2MappingExport.VERT_AGG". Add all relevant values.

ihow:	Draw categories using u	nique values combining u	n to 3 fields	mport
Features Categories	Value Fields	Color Ramp		
- Unique values	Phase2MappingExport.VER			÷
Unique values, many l Match to symbols in a	Phase2MappingExport.VER	T_ DEG 💌		
Quantities	<none></none>			
Charts				
Multiple Attributes	Symbol Value	Label	Count	
	<all other="" values=""></all>	<all other="" values=""></all>		
	No, No	No, No	?	
	No, Yes	No, Yes	?	*
				the second se

Unique Value, many fields in Symbology

Change the "Aggradation vs. Degradation" polygon symbols to the various fill patterns for "No, Yes", Yes, No", and "Yes, Yes".

Change the "<Heading>" "CNST_CNTRL" to "RANGE"

Sample Stream Sensitivity Map:



Corridor Planning Map Guidance Appendix