ArcGIS
Lab 4: Model Builder

QUICK OVERVIEW:

1. **Issue**: determine the area and value of the land contained in the buffer zones previously generated (exactly the same as last week)

2. **Learning Objectives**: to gain proficiency using Model Builder, as well as the tools Merge and Intersect

3. **Data**: you will be utilizing the same data set as last lab.

4. **Analysis**:
    a. Create a custom toolbox
    b. Create a model that will utilize several tools (buffer, clip, etc.)

5. **Interpret Results**: be sure you understand all new map data that you create

6. **Communicate Results**: make a map layout that clearly communicates your results.

THE ISSUE

There is no new issue, i.e. no new resource management issue to solve. Instead we are learning an automated way to conduct an analysis that has several steps. This is called analytical modeling (a.k.a. cartographic modeling) – refer to Figure 1 on following page. Also, conduct the Virtual Campus module 7-2 and refer to the Modeling write-up before reading any further.

As previously outlined, this lab essentially conducts most of the analyses from the previous two labs:

- Buffer streams and trails (but with different widths)
- Merge the buffers into one layer
- Dissolve the VIU Forest boundary into 2 polygons: private and Crown
- Intersect the combined buffer layer with VIU boundary

The differences are:

- Only 2 buffers will be conducted (just to keep the model to a reasonable size)
    - All trails will be buffered by 40 m
    - New width field will be used to buffer streams
- Merge will be used instead of Append
- Intersect will used instead of Clip
- Model Builder will be used for the entire process

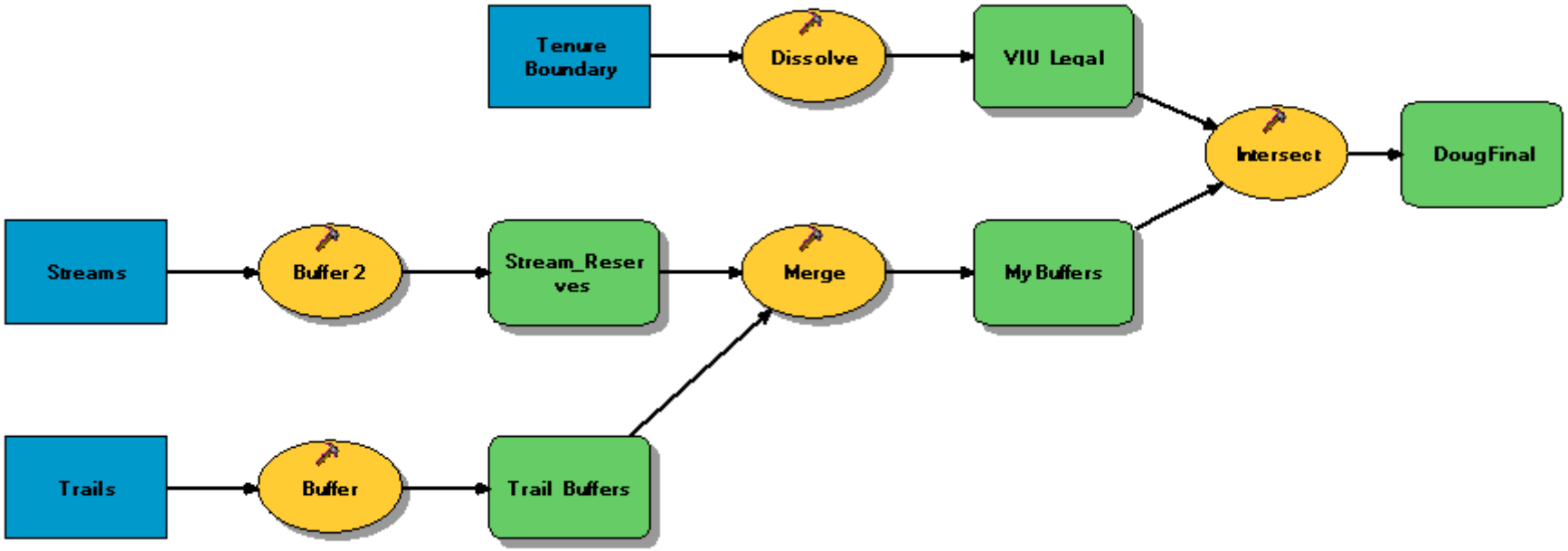

Figure 1: Analytical Model – "The Plan"

LEARNING OBJECTIVES
You will further develop the following ArcGIS skill sets:

- Utilize Model Builder to conduct a multi-step analysis
- Create a map layout.

Conceptual learning objectives include:

- Understanding the difference between
    - Clip and intersect
    - Append and merge

DATA

You already have the data from the last lab. There is no new data to copy from the G: drive.

ANALYSIS & INTERPRETATION (you should interpret all new data layers as you create them)

- Prior to developing and running a model you should edit the attribute table for Streams and add a field called **Width** (use long integer). This field is to contain a revised version of buffer widths – use the *field calculator* to populate it with values that are 1.5 times as large as what are contained in the Buffer field.

Create a custom toolbox
The first step is to create your very own custom toolbox.

- Ensure ArcToolbox is open. Right-click in the empty white area in ArcToolbox and choose *New Toolbox*. Name the new toolbox **My Tools**.

It is good practice to add the tools you will be using in your model to your toolbox.

- Right-click *My Tools* toolbox > Add > Tools
- Expand *Analysis Tools* > expand *Overlay* > "tick" *Intersect*
- Under *Analysis Tools* > expand *Proximity* > "tick" *Buffer*
- Expand *Data Management Tools* > expand *General* > "tick" *Merge*
- Under *Data Management Tools* > expand *Generalization* > "tick" *Dissolve*
- Click OK.

Now all the tools are readily available.

Create the model
The next step is to create the model – it 'resides' within your toolbox. This is somewhat akin to you becoming a carpenter/ builder 'in the old days' when you actually made your own tools. First you create a box to put your tools in, and then you make things like mallets and

wedges and whatnot and place them in your toolbox. Right now, you're making yourself a mallet …

- Right-click the *My Tools* toolbox > then New > then Model.
- In the Model Properties use **Reserves** as the Name and Label.
- Add a description that describes what the model does (i.e. provide a numbered list of steps used)
- Save the model

Change diagram style
Next you will alter the display of the model from the default where map inputs are in ovals to the alternate schematic where map inputs are in rectangles.

- Click the menu option Model > then Diagram Properties > then Symbology tab > choose Style 2 > click OK

Make your model
Now you need to construct your model. Based on your experience from module 7-2 and Figure 1, build your model. Note the following:

- For the intermediate layers you can simply accept the default names - ** just be very sure that the files are saved to your working directory – **When you are defining the parameters for each analysis tool, I suggest using the Browse button on the dialogue box to ensure folder and filename are correct.**

- trail buffer width is 40 metres and stream buffer will be variable based on the newly added field *width*

- you can right-click on the components of the model to rename them to match the diagram provided - ** obviously the final map on your model will use your own name

- ensure boxes are large enough so the names don't scroll onto a second line

- you will need to add extra detail regarding some steps (i.e. for Buffers you should add a **label** that states the width) – that detail is missing from my diagram, but is needed on yours (… I know … do as I say and not as I do …) – place the label below the oval that contains the tool name.

- **Save your model**

- Run your model

- Add the final data layer that was created to your TOC (if it was not added automatically)

- Look at the resultant data layer and determine if the reserves within the Schedule A (or Schedule B) are broken into sections – if they are you will need to add a final step to your model such that adjacent reserve buffers within the Schedule A (and Schedule B) portions are combined (remember Pinochio's nose form the *Modeling* web page?)

- Once you are satisfied that your model is complete, export your model as an Enhanced Meta File (emf) called YourSurnameModel (i.e. CorrinModel)

- **Save your model**

Determine the total area and value of land
Once your model is finalized, you'll need to edit the attribute table so that you can determine the area (hectares) and value ($) of the land within the reserves, based on the following:

  - Value of Schedule A land = $80,000/ha
  - Value of Schedule B land = $55,000/ha

Save your map document.

Map Layout
You will now be altering your previous map layout. Before doing this be sure you have saved the current layout (according to Lab 2: Buffer) as an **png** (this file format results in a smaller file size than jpeg and any text will be 'crisper').

Alter the map layout such that it displays the Streams, Trails, Lakes, Forest, Paved Roads, Gravel Roads, Neighbours, and your final data layer from this lab. No other layers should be displayed.

- Keep the map template: LandscapeClassic.mxt (i.e. no need to alter it)
- Symbology for the layers should be as previously stated, except
  - The final buffer reserves should be symbolized using a "10% crosshatch" pattern (scroll down in the Symbol Selector) with a dark-green colour for both the fill and outline (set the outline width to 1.0 pt.).
- Give your map a title of "VIU Forest – Special Mgmt Areas Ver. 2".
- Double click the text below the scale bar and enter your name – set the text size to 36.
- Move, edit and resize the legend, north arrow and scale bar as needed to provide effective communication.
- Add a statement that summarizes your findings (i.e. Land area and value for Schedule A & B lands)
- Apply a light data frame background colour that complements the map.

Set the scale to 1:15,000.

Export your current map as a **.png** file to your **U** drive. Include your surname as part of the filename.

Email you model and map layout to doug.corrin@viu.ca

Save your map document for the final time and exit ArcMap.