

July 19, 2013

## Deliverable: Develop geo-processing tool for sediment submodel structure

### Baseline Geo-processing Tool Description

The Baseline tool was developed in Python using the Arcpy framework for ArcGIS. It produces the base data, a geodatabase of watersheds overlaid with landscape data that other contaminant load estimation tools use as their input. There are two baseline options: Hydrology and Sediment. Currently, the user has the option of using either baseline data output as input to any contaminant load tool. The inputs for the Baseline options are slightly different (Table 1).

Input Data	Hydrology	Sediment
watersheds	✓	✓
land use	✓	✓
soils	✓	
geology		✓
slope	✓	✓
precipitation	✓	

Table 1

The development of the tool interface has been iterative, and has been simplified significantly (Figure 1). All spatial input data are predetermined for the tool, and thus users cannot alter them. Users are able, however, to modify the lookup table inputs and slope bins, therefore affecting the final runoff volumes/sediment loads. Upon selection of parameter “Baseline Calculations”, the tool internally handles which inputs and calculations are used, reducing user error.

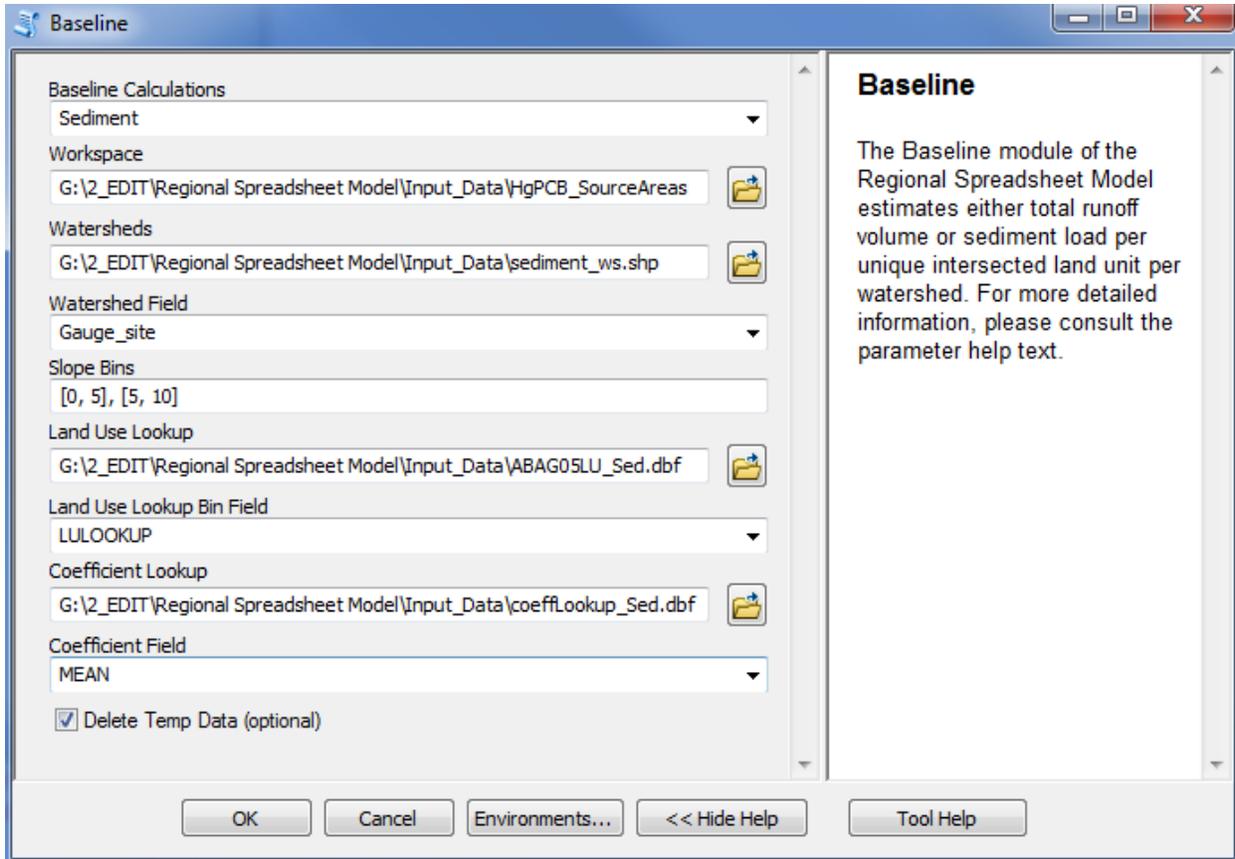


Figure 1

The tool workflow operates this way for each watershed in the input watershed shapefile:

1. The watershed polygon is intersected with land use and soils/geology polygons. The resulting overlaid watershed is now composed of multiple “land units” with unique combinations of land use and soils/geology types (Figure 2).
2. Average precipitation and/or slope values are calculated for each land unit.
3. The average slope values and land use codes are binned according to user input, and a code that represents the unique combination of slope bin – land use bin – soils / geology is assigned to each land unit.
4. Referencing the coefficient lookup table by code, runoff/sediment values are then assigned to each land unit (Figure 3).



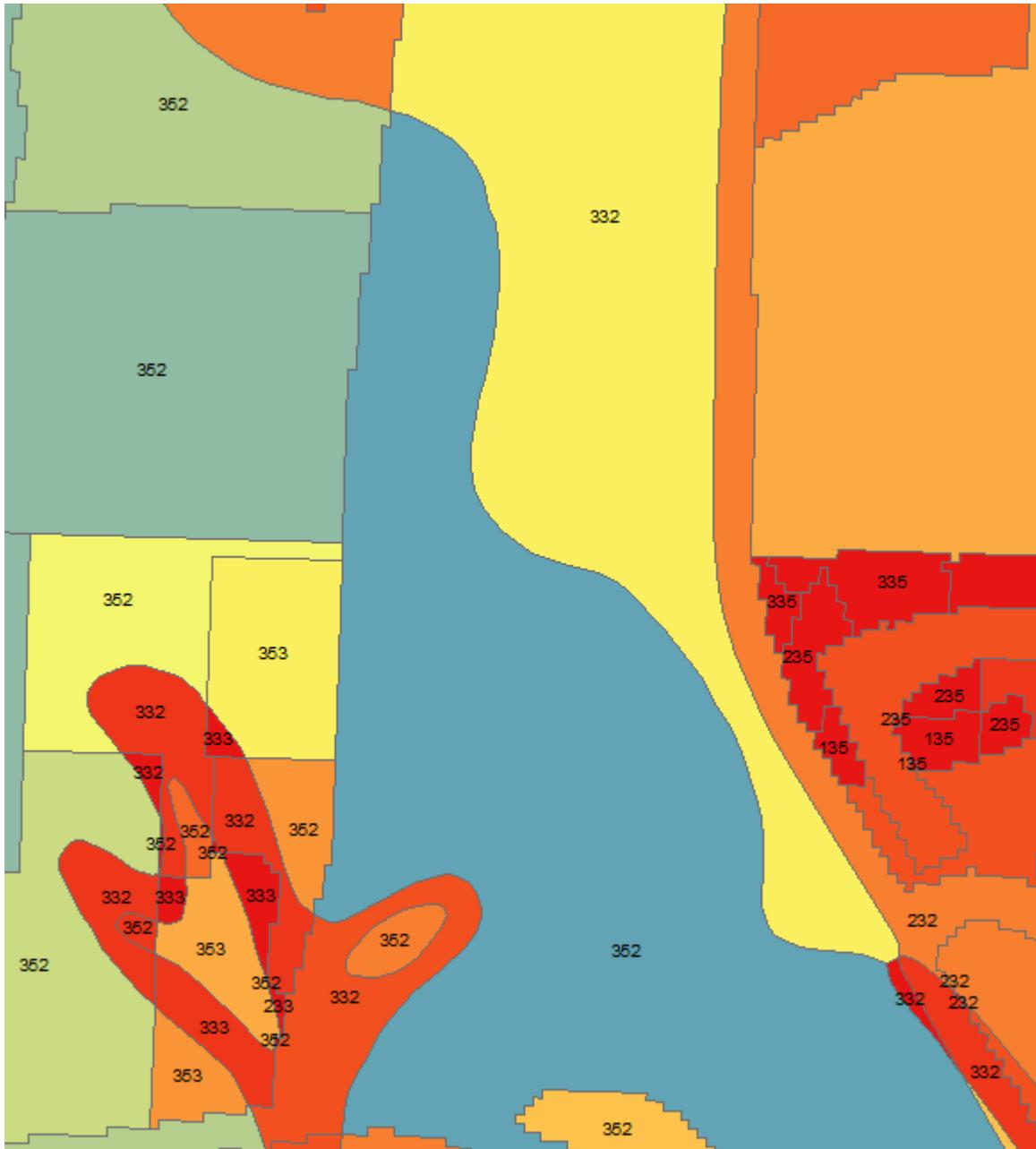


Figure 3. Land unit polygons with codes labeled, and sediment load mass in red (low) to blue (high).

In addition to the geodatabase output, two statistics CSV tables are also produced. One table reports the percentage of total watershed area occupied by each landscape data category (slope bin – land use bin – soils / geology), the average weighted slope and/or precipitation, and the total watershed runoff volume / sediment load; the other table reports the percentage of total watershed area for each descriptive land use type per watershed.