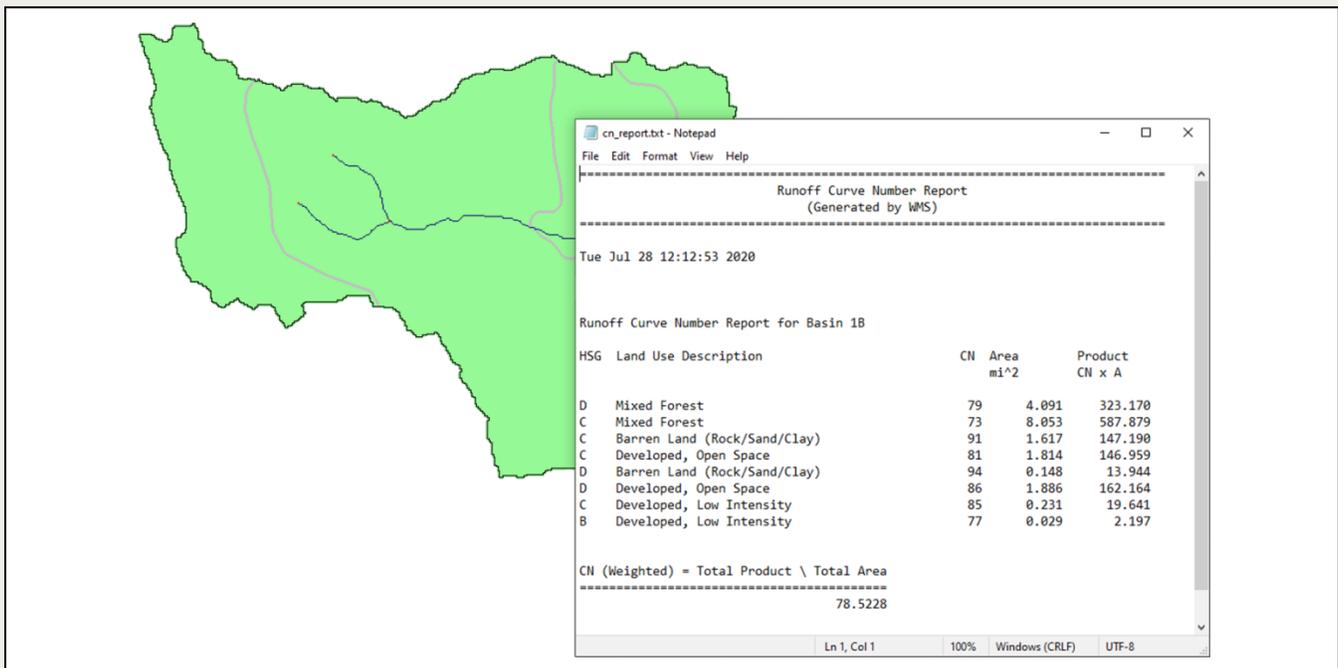




WMS 11.4 Tutorial

Computing a Curve Number

Compute a curve number, an important hydrologic parameter.



Objectives

Learn how to compute a curve number for a watershed.

Prerequisite Tutorials

- DEM Delineation

Required Components

- Data
- Drainage
- Map
- Hydrology
- Hydrologic Models

Time

- 15–20 minutes

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1 Introduction

A curve number is an important hydrologic parameter based off of the watershed's soil group, land use, treatment and hydrologic conditions. When evaluating a watershed, there are many interrelated factors that influence infiltration volumes and rainfall excess. One way to evaluate the effects of these conditions is to use the curve number method. Using a curve number aids in the process of producing an accurate outflow hydrograph for the model.

This tutorial will cover how to compute a curve number for a watershed using a basic DEM delineation.

2 Getting Started

Starting with a new WMS project at the beginning of each tutorial is recommended. This resets the data, display options, and other WMS settings to their defaults. To do this:

1. If necessary, launch WMS.
2. If WMS is already running, press *Ctrl-N* or select *File | New...* to ensure that the program settings are restored to their default state.
3. A dialog may appear asking to save changes. Click **Don't Save** to clear all data.

The Graphics Window of WMS should refresh to show an empty space.

3 Importing a Delineated Watershed

To begin the project, open a previously delineated watershed by doing the following:

1. Select **Open**  to bring up the *Open* dialog.
2. Navigate to the *Curve Number* folder for this tutorial.
3. Change the *Files of type* to "WMS XMDF Project File (*.wms)".
4. Select "Start.wms" and click **Open** to import the project and close the *Open* dialog.

The project should appear similar to Figure 1.

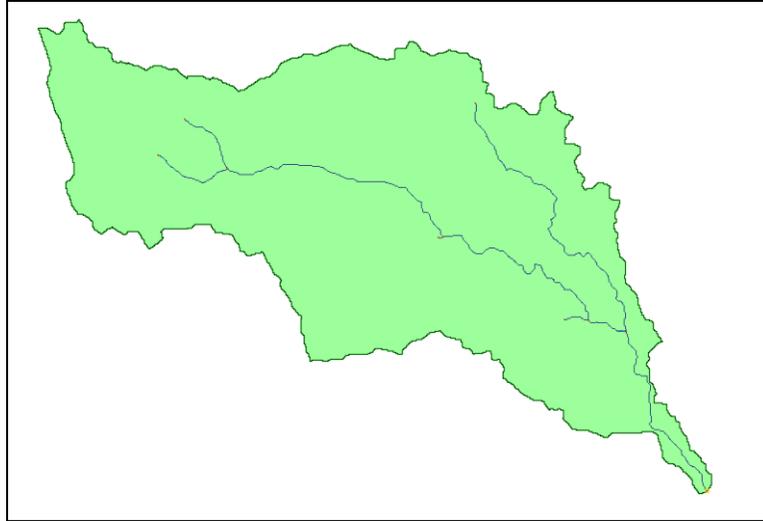


Figure 1 Delineated watershed

4 Defining Land Use and Soil Type

In order to compute the curve number, it is necessary to obtain land use and soil type data for the area and associate this data with the model. An already obtained shapefile may be imported and used, or the **Get Data Tool**  may also be used if there is no prior data for the site. For the purposes of this tutorial, the **Get Data Tool**  will be used.

4.1 Obtaining Land Use and Soil Type Data

1. Using the **Get Data Tool** , select a rectangle around the watershed to bring up the *Data Service Options* dialog.
2. Scroll to the right and select *Land Use Shapefile (US Only)* from the list.
3. Click **OK** to bring up the *Save Web Services Data File(s)* dialog.
4. Enter "WintersLandUse" as the file name, and click **Save** to exit the *Save Web Services Data File(s)* dialog.
5. Click **Yes** to close the dialog that appears asking to create the following file.
6. If a dialog appears stating that the shapefile coordinates need to be converted, click **Yes** to close this dialog.
7. If a second dialog appears with the same statement, click **Yes** to close this one also.

This should have imported two new shapefiles in the Project Explorer under the "GIS Data" folder titled "sacramento.shp" and "santa_rosa.shp".

8. In the Project Explorer, right-click on the "Drainage" coverage and select **Zoom To Layer**.
9. Using the **Get Data Tool** , select a rectangle around the watershed to bring up the *Data Service Options* dialog.
10. Scroll to the right and select *Statsgo Soil Type Shapefile (US Only)*.

11. Click **OK** to bring up the *Save Web Services Data File(s)* dialog.
12. Enter “WintersSoilType” as the file name, and click **Save** to exit the *Save Web Services Data File(s)* dialog.
13. Click **Yes** in the dialog that appears asking to create the following file.

4.2 Creating the Land Use and Soil Type Coverages

The next step is to create land use and soil type coverages for the project. The previously imported shapefiles will then be mapped to the coverages. But first, the NRCS attributes need to be associated with the soil type so the data can be recognized properly by WMS.

To associate the attributes:

1. Right-click on the “ gsmsoilmu_a_ca.shp” shapefile in the Project Explorer and select **Join NRCS Data...** to bring up the *Join NRCS data* dialog.
2. Click **OK** to close the *Join NRCS data* dialog and open the *Select a Name for the Joined Shapefile* dialog.
3. Click **Save** to accept the new file name and close the *Select a Name for the Joined Shapefile* dialog.

To create the land use and soil type coverages:

4. In the Project Explorer, right-click on “ Coverages” and select **New Coverage** to open the *Properties* dialog.
5. Change the *Coverage type* to “Land Use” in the drop-down menu.
6. Click **OK** to close the *Properties* dialog and create the “ Land Use” coverage.
7. Repeat steps 4–6, choosing “Soil Type” in step 5 to create the “ Soil Type” coverage.

Now to assign the values from the shapefiles to the new coverages:

8. Right-click on the “ Drainage” coverage and select **Zoom to Layer**.
9. In the Project Explorer, select “ sacramento.shp” to make it active.
10. Using the **Select shapes tool** , select a rectangle around the watershed to select the polygons that overlap the watershed.
11. Select *Mapping | Shapes* → **Feature Objects** to open the *GIS to Feature Objects Wizard – Step 1 of 3* dialog.
12. Change the *Select a coverage for mapping* drop-down menu to “Land Use”.
13. Under the *Select shapefiles to map* section, turn off “ gsmsoilmu_a_ca.shp” and “ gsmsoilmu_a_ca_joined.shp”.
14. Click **Next>** to move to *Step 2 of 3* in the wizard.
15. Click **Next>** to move to *Step 3 of 3* in the wizard.
16. Click **Finish** to exit the *GIS to Feature Objects Wizard*.
17. If any warnings come up, click **OK** to close the warning dialog.
18. Select *Mapping | Shapes* → **Feature Objects** to open the *GIS to Feature Objects Wizard*.

19. Using the drop-down menu, change the *Select a coverage for mapping* to “Soil Type”.
20. Under the *Select shapefiles to map* section, turn off everything except  *gsmsoilmu_a_ca_joined.shp*.
21. Click **Next>** to move to *Step 2 of 3* in the wizard.
22. Click **Next>** to move to *Step 3 of 3* in the wizard.
23. Click **Finish** to exit the *GIS to Feature Objects Wizard*.

Now that the shapefiles have been mapped to the appropriate coverages, they are no longer needed in this project. To delete the shapefiles:

24. Right-click on  “GIS Data” and select **Clear All Data** to delete all shapefiles.

5 Computing the Curve Number

Now that the watershed has been delineated and the land use and soil type data has been specified for the watershed, it is possible to compute the curve number for the area. To compute the curve number:

1. Switch to the **Drainage Module** .
2. Select *DEM* | **Compute Basin Data** to bring up the *Units* dialog.
3. Click **OK** to accept the defaults and exit the *Units* dialog.
4. Switch to the **Hydrologic Modeling Module** .
5. Select *Calculators* | **Compute GIS Attributes...** to bring up the *Compute GIS Attributes* dialog.
6. Ensure under *Computation*, “SCS Curve Numbers” is selected from the drop-down.
7. In the *Mapping* section, click **Import** to bring up the *Open* dialog.
8. Navigate to the *CurveNumber* folder for this tutorial and select “LandUseCodes.txt”.
9. Click **Open** to import the table and exit the *Open* dialog.
10. Click **OK** to exit the *Compute GIS Attributes* dialog and bring up the *View Data File* dialog.
11. Select the desired text editor from the list, and click **OK** to open the text editor and exit the *View Data File* dialog.

It is now possible to view the computed curve number for the watershed.

6 Conclusion

This concludes the “Curve Number” tutorial. This tutorial covered how to:

- Import land use and soil data
- Compute a curve number for a watershed