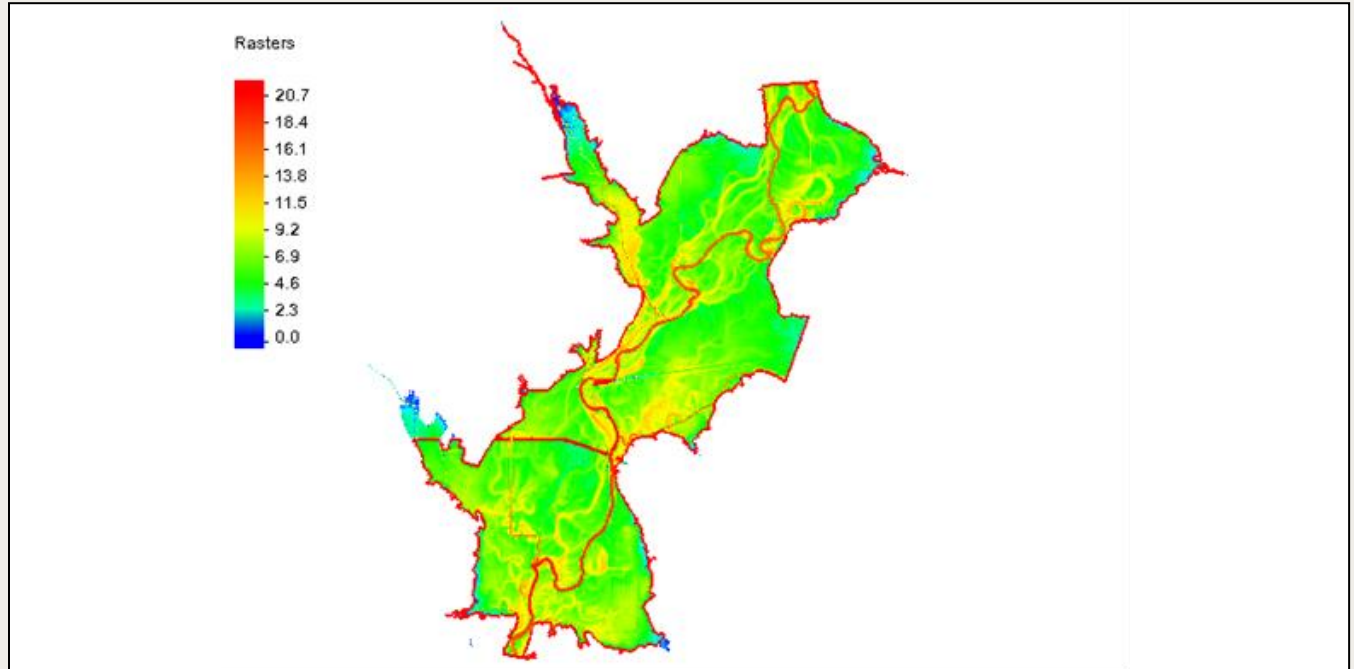




SMS 13.3 Tutorial

Raster to Flood Depth

Generating flood depths from raster data



Objectives

This tutorial demonstrates how to generate flood depths from a raster file.

Prerequisite Tutorials

- Overview
- Map Module
- GIS

Required Components

- SMS Core

Time

- 20–30 minutes

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1 Introduction

This tutorial demonstrates using an elevation raster to calculate flood depths.

For SMS to calculate flood depths from an elevation raster, the following needs to be in the SMS project:

- An elevation raster file
- A water surface elevation dataset

The data used in this tutorial is from the Eel River in the state of California in the United States. The water surface elevation dataset was generated using SRH-2D. The projection for the project has been preset.

2 Getting Started

Start by importing a project file containing the data for this:

1. Launch SMS. If it is already launched, press *Ctrl+N* to reset to the default settings. Click **Don't Save** if asked to save changes.
2. Select *File* | **Open...** to bring up the *Open* dialog.
3. Select "Project Files (*.sms)" from the *Files of type* drop-down.
4. Browse to the *data files* folder for this tutorial and select "FloodDepths.sms".
5. Click **Open** to import the project and exit the *Open* dialog.

The project should appear similar to Figure 1. The contoured area near the center is the location of the pre-generated mesh.

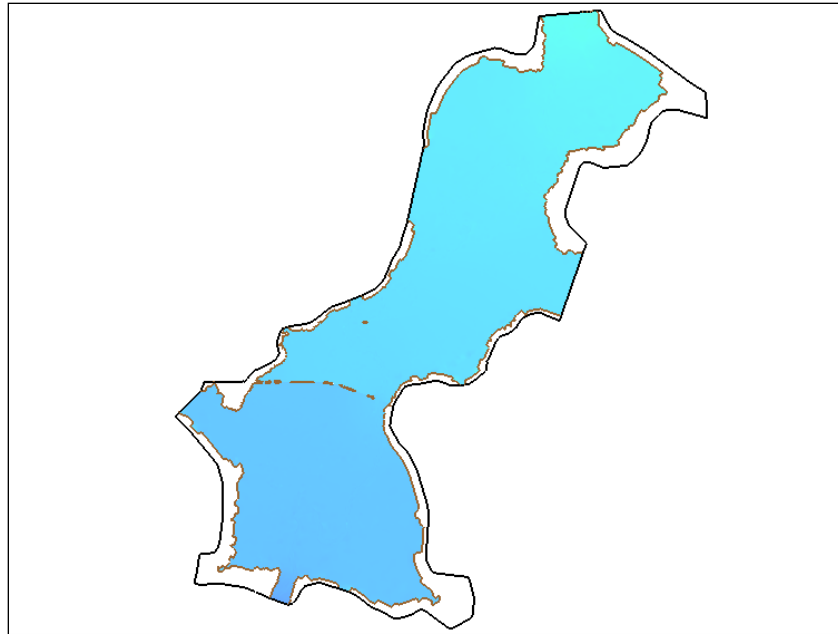




Figure 1 Initial project

3 Reviewing the Existing Project

Most of what is needed to compute the flood depths has already been set up in the project. Review data by doing the following:

1. Select the “ Z” dataset under the “ EelRiver” mesh.

The mesh should appear similar to Figure 2.

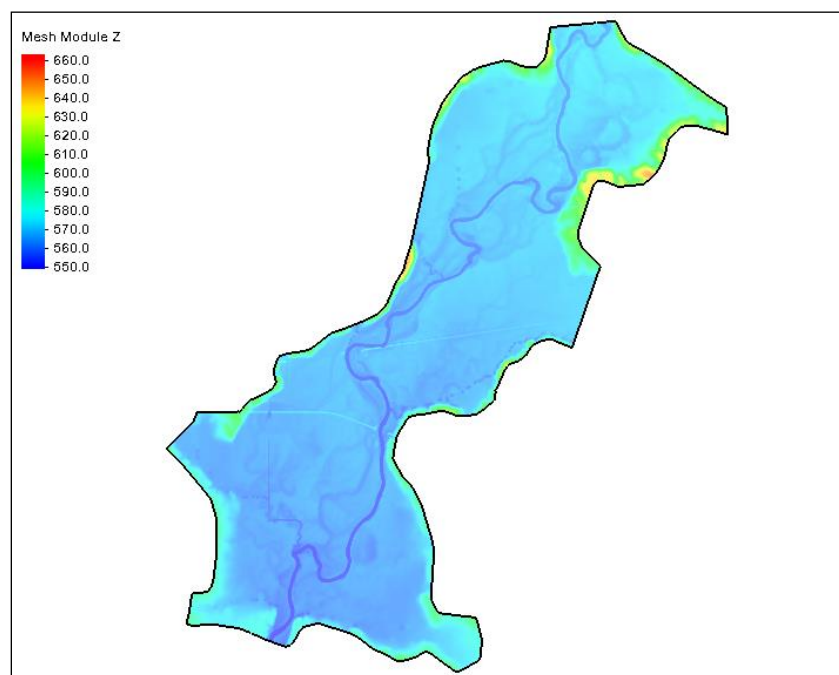


Figure 2 Mesh elevation

The mesh was generated with a grid spacing between 12 and 287 ft with an average element size of 72 ft. Switch back to the water surface elevation dataset by doing the following:

2. Select the “WSE” dataset under the “EelRiver” mesh.

The water surface elevation dataset was generated using SRH-2D. The dataset has a single time step. Notice that in comparing the elevation dataset and the water surface elevation dataset, the water surface elevation does not extend above 600.

Now to review the raster of the terrain by doing the following:

3. In the Project Explorer, hide the “EelRiver” mesh.
4. Turn on the “ElevBelow600.tif” raster under “GIS Data”.

The raster should appear as in Figure 3.

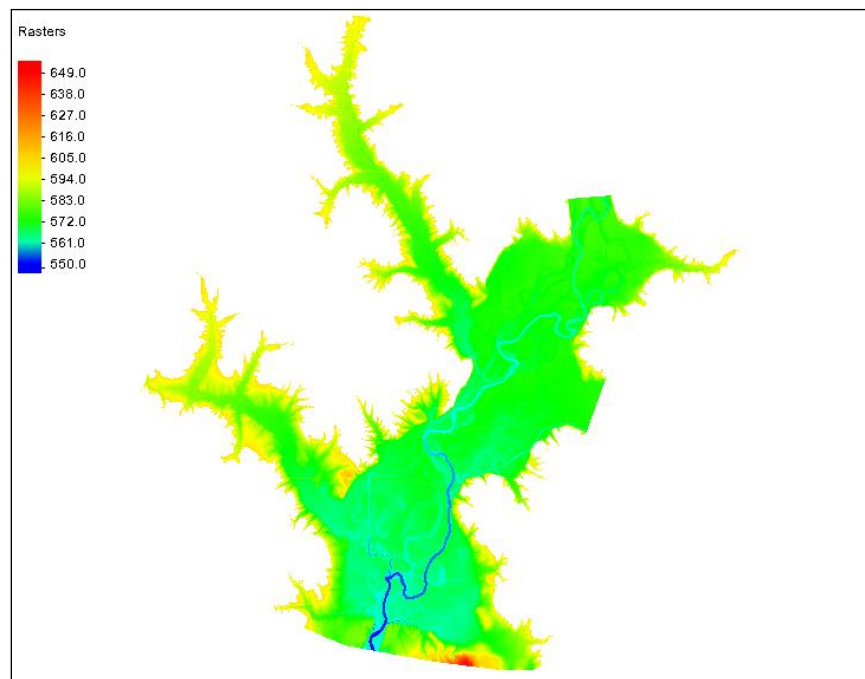


Figure 3 The trimmed elevation raster

The raster has been trimmed to include the areas of the DEM with elevations below 600 ft. This is to reduce the size and increase efficiency. The raster has a pixel size of 5ft. This results in having approximately 3 pixels in the smallest mesh element, 100 pixels in average element, and 2500 pixels in the largest element.

4 Creating Flood Depths

With the necessary data in place, the WSE/Depths Raster from Dataset tool can be used. To use the tool, do the following:

1. Right-click on the “ElevBelow600.tif” raster and select **Convert to | Flood Depths** to open a *WSE/Depth Raster from Dataset* dialog.
2. For the *Elevation Raster*, select “GIS Data/ElevBelow600.tif”.
3. For *WSE Dataset*, select “Mesh Data/EelRiver/WSE”.

4. For the *Number of Pixels to Extrapolate*, enter “640”.

The extrapolation value will smooth out and fill in holes the generated raster.

5. For the *Output WSE Raster*, enter “Flood_WSE”.
6. For the *Output Depth Raster*, enter “Flood_water_depths”.
7. Click **OK** to run the *WSE/Depth Raster from Dataset* tool.

It may take a few minutes for the tool to finish running.

8. When the tool has finished, click **OK** to close the *WSE/Depth Raster from Dataset* tool.

The new flood depths rasters will be loaded into SMS.

5 Viewing the Results

Now to review the flood depths results by doing the following:

1. Turn off the “ ElevBelow600.tif” and “ Flood_WSE.tif” raster.

The Graphics Window should appear as in Figure 4.

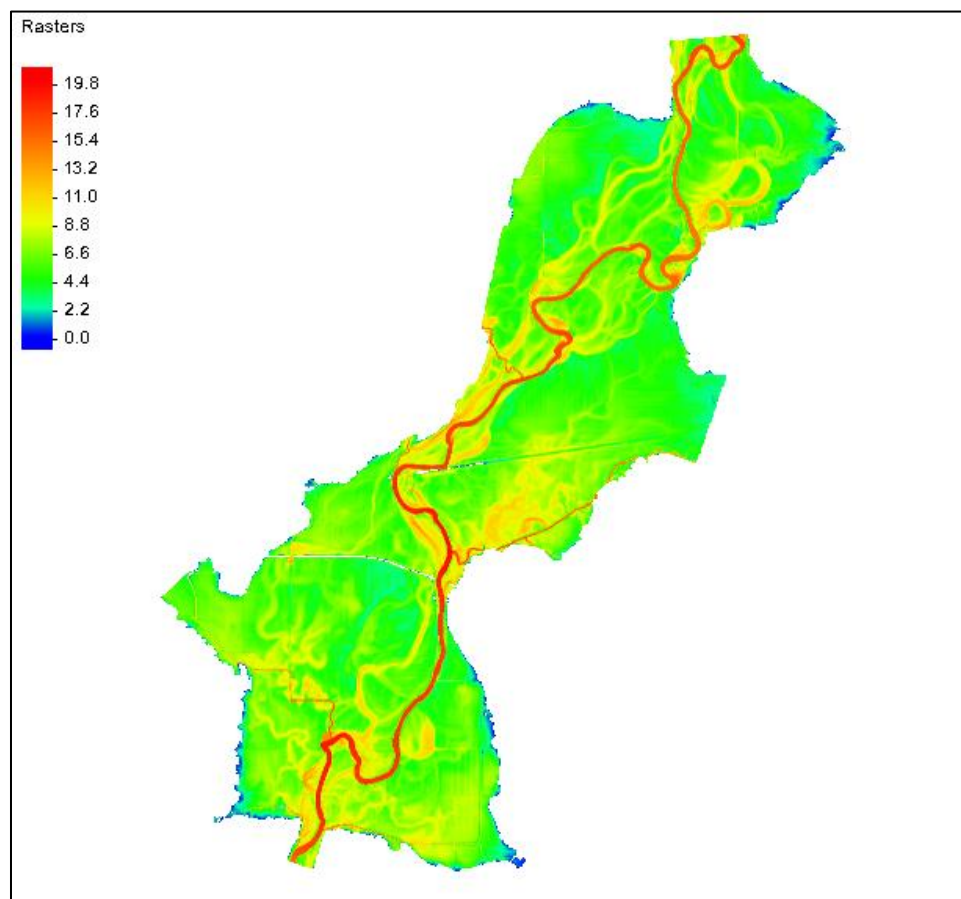





Figure 4 The flood depths raster and flood depths coverage

2. Turn on the “ EelRiver” mesh.

Notice the flood depths are contained within the mesh.

3. Turn off the “ EelRiver” mesh and the “ Flood_water_depths.tif” raster.
4. Turn on the “ Flood_WSE.tif” raster.

The WSE raster should appear similar to Figure 5.

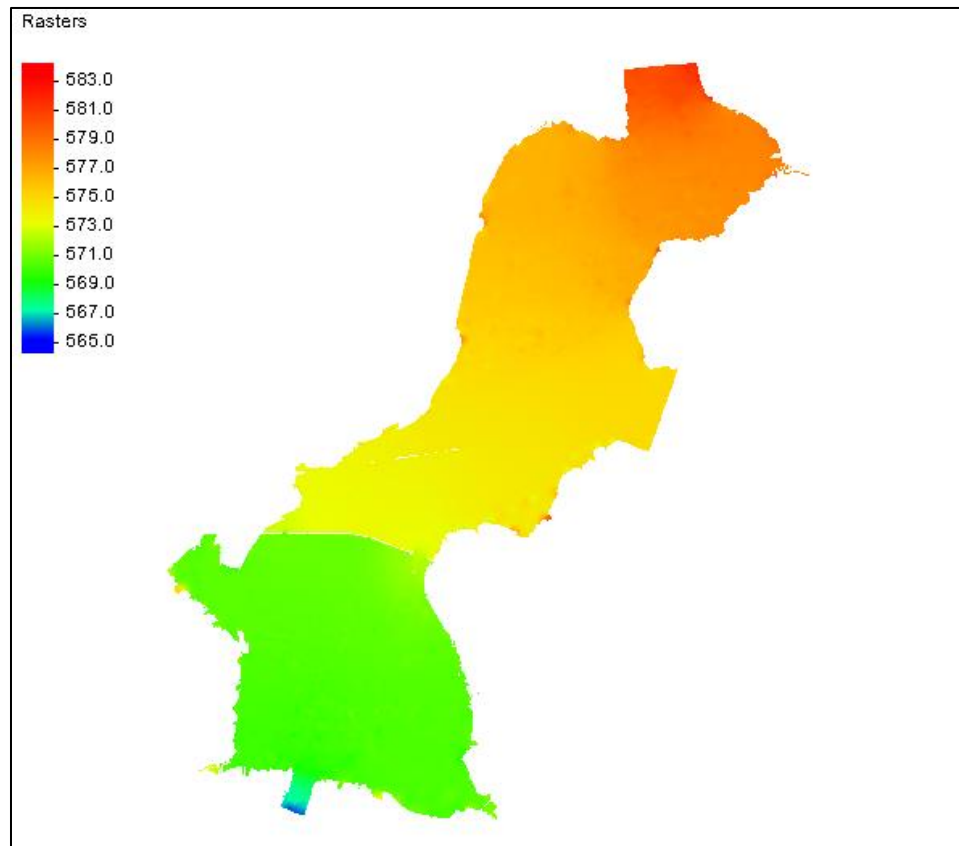



Figure 5 Flood depths boundary

6 Polygon from Flood Raster


Using the flood raster, SMS can generate polygon that shows the boundary of the flood area. To do this:

1. Click the **Toolbox**  macro to open the *Toolbox* dialog.
2. In the “Coverages” folder, select the *Polygon from Raster Bounds* tool.
3. Click **Run Tool** to open the *Polygon from Raster Bounds* dialog.
4. For the *Input raster*, select “GIS Data/Flood_water_depths.tif”.
5. For the *Output coverage*, enter “Flood_Bounds”.
6. Click **OK** to run the *Polygon from Raster Bounds* tool.

It may take a few minutes for the tool to finish running.

7. When the tool has finished, click **OK** to close the *Polygon from Raster Bounds* tool.

A new area properties coverage will appear in the Project

8. Turn off all rasters in the Project Explorer.
9. Select the “ Flood_Bounds” coverage.

The flood bounds should appear similar to Figure 6.

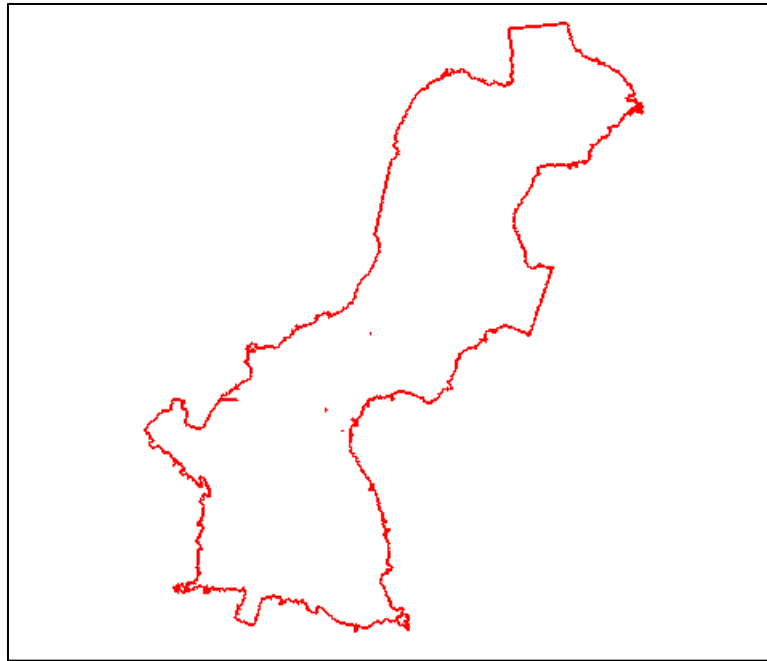


Figure 6 Flood bounds generated from raster data

7 Conclusion

This concludes the “Raster to Flood Depths” tutorial. Feel free to continue to experiment with SMS, or exit the program.