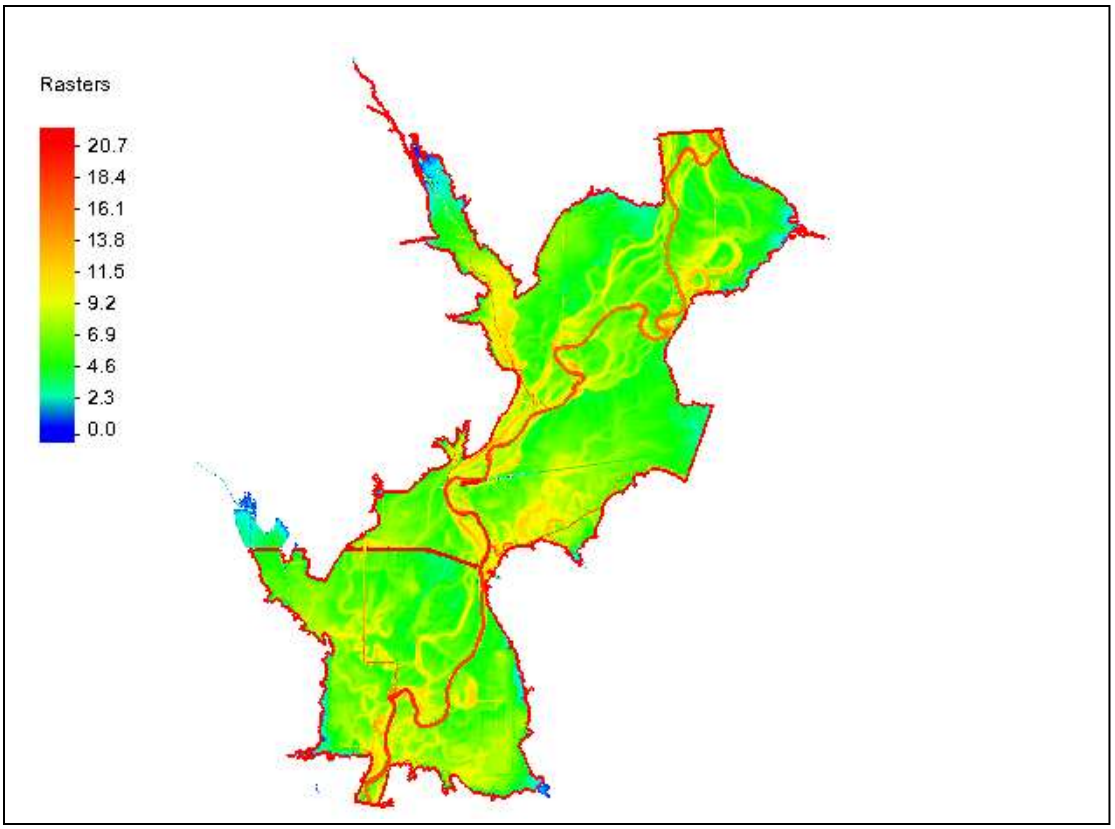
SMS

v. 13.1

SMS 13.1 Tutorial

Raster to Flood Depth



Objectives

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

Prerequisites

- SMS Overview
- Map Module
- GIS

Requirements

- Map Module
- Mesh Module
- Annotations Module

Time

- 10–20 minutes

AQUAVEO™

1 Introduction

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

For a 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 the SMS application.
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.

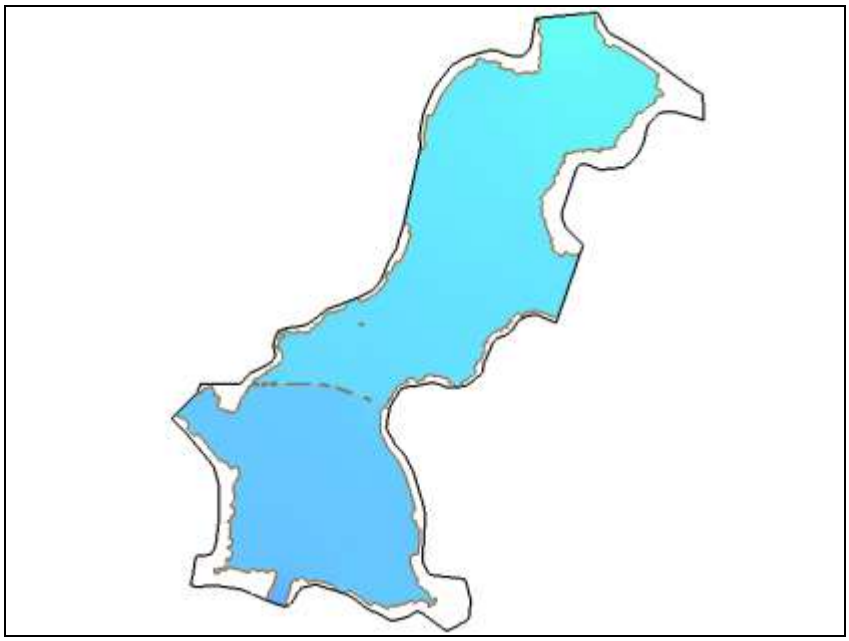


Figure 1 Initial project

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 "Z" dataset under the "EelRiver" mesh.

The mesh should appear similar to Figure 2.

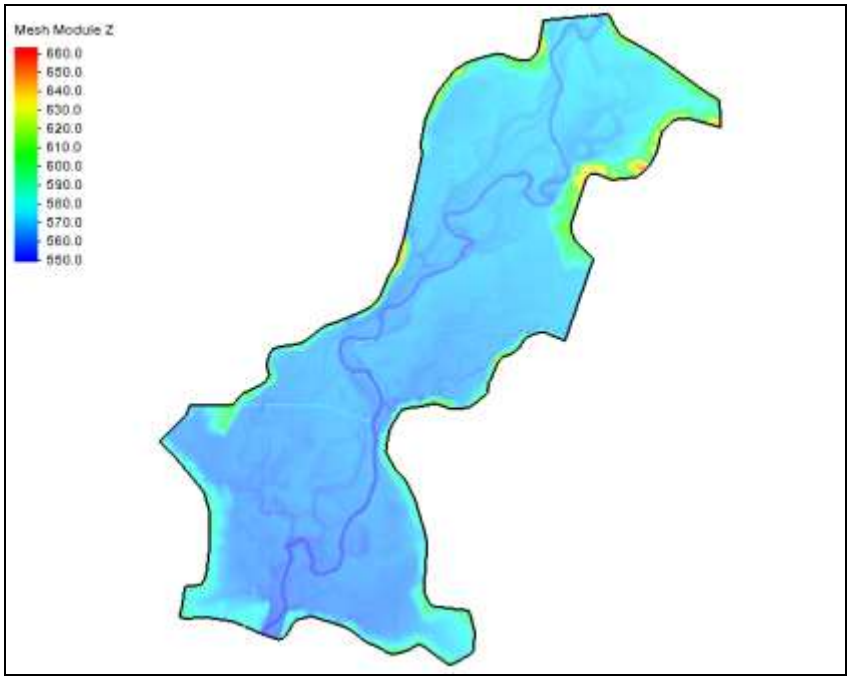


Figure 2 Mesh elevation

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.

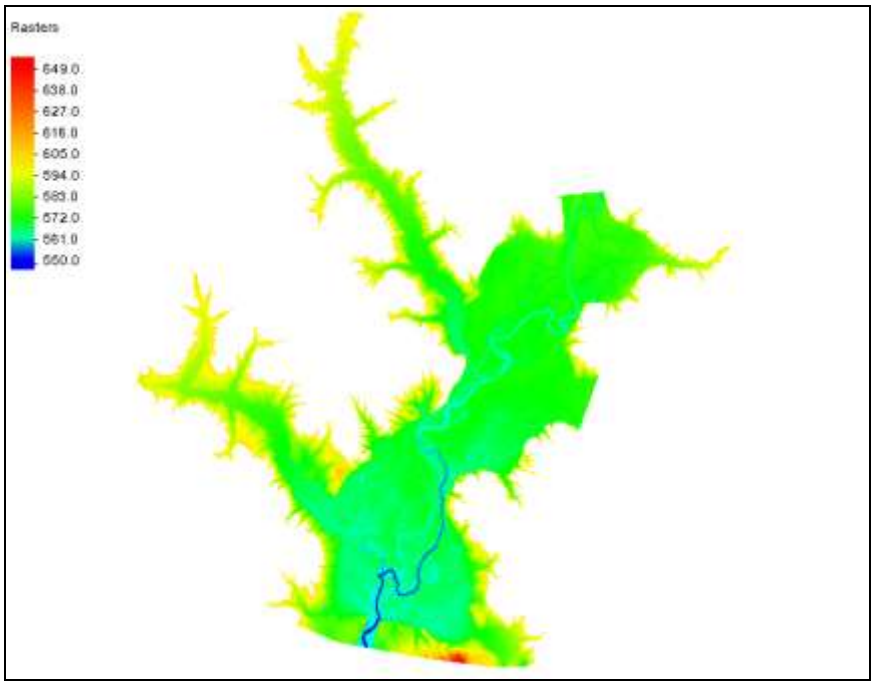


Figure 3 The trimmed elevation raster

The raster has been trimmed to include the areas fo the DEM with elevatoins below 600 ft. This is to reduce the size and increase efficiency. The raster has a pixel size fo 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 Flood Depths 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 *Flood Depth Raster Optionst* dialog.
2. Next to *Geometry*, click the **Select** button to open a *Select Tree Item* dialog.

3. Select the "EelRiver" mesh and click **OK** to close the *Select Tree Item* dialog.
4. Next to *WSE Dataset*, click the **Select** button to open a *Select Tree Item* dialog.
5. Select the "WSE" dataset and click **OK** to close the *Select Tree Item* dialog.
6. Click **OK** to close the *Flood Depth Raster Options* dialog.

The Flood Depths tool will begin processing. It may take a few minutes for the tool to finish running.

7. When the *Save As* dialog appears, change the File name to "Flood_water_depths" and click **Save** to create the new raster.

The new flood depths raster will be loaded into SMS and a new coverage will be generated.

5 Viewing the Results

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

1. Turn off the "ElevBelow600.tif" raster.

The Graphics Window should appear as in Figure 4.

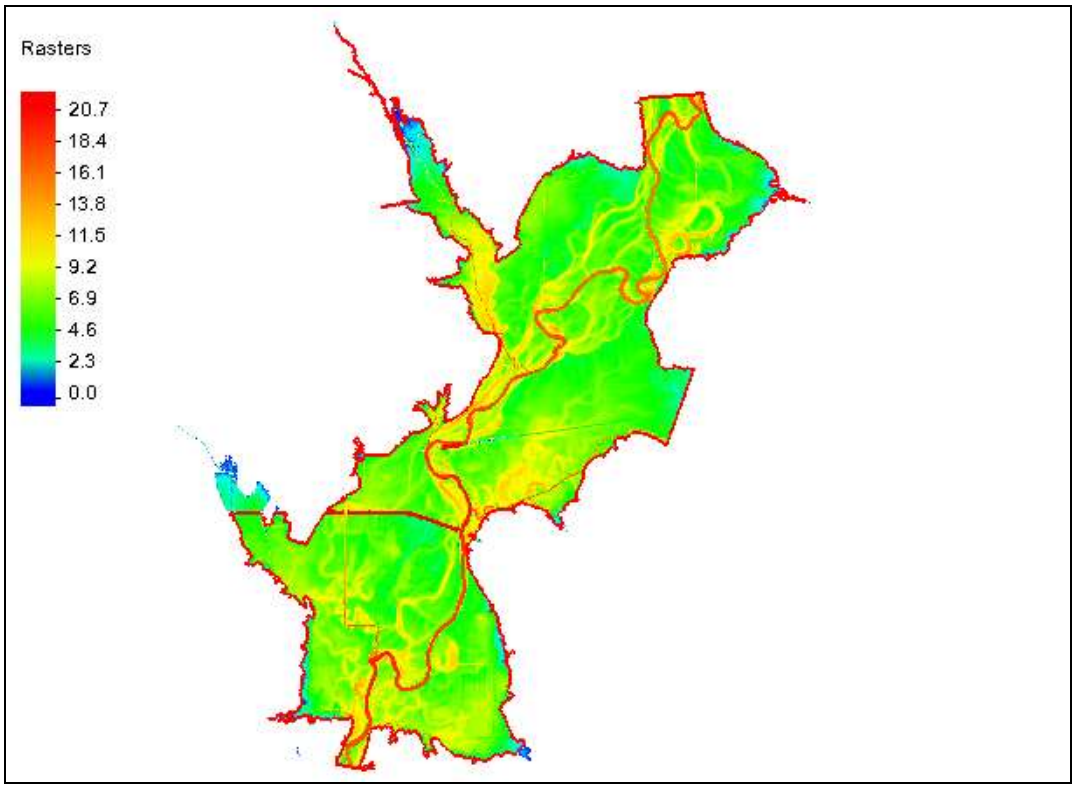


Figure 4 The flood depths raster and flood depths coverage

2. Turn on the "EelRiver" mesh.

Notice the flood depths extend beyond the mesh limits to other areas of the raster that would be flooded.

3. Turn off the "EelRiver" mesh and the "Flood_water_depths.tif" raster so only the "Flood_water_depths_boundary" coverage is visible.

The water depth boundaries should appear similar to Figure 5. Notice that the boundaries do not include all areas of the flood depth raster. This is because the boundaries does not include areas that would be considered with very little flooding or small islands that might form.

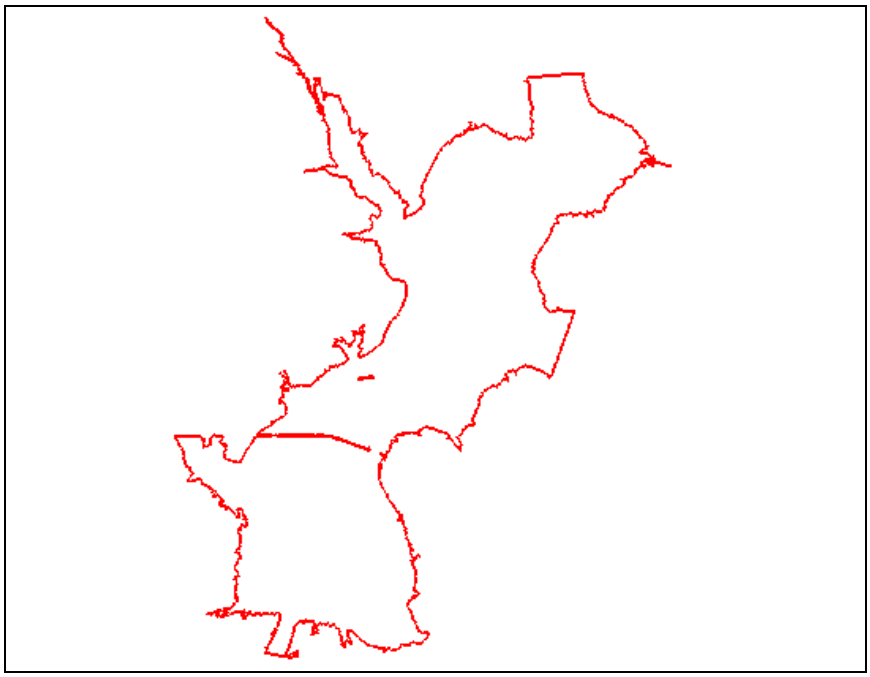


Figure 5 Flood depths boundary

4. Turn on the "Flood_water_depths.tif" raster and the "EelRiver" mesh.
5. Select the **Display Options** macro to open the *Display Options* dialog.
6. Select "2D Mesh" from the list on the left.
7. Turn off the *Contours* option and turn on the *Elements* and the *Wet/dry boundary* options.
8. Click **OK** to close the *Display Options* dialog.
9. Using the **Zoom** tool, zoom in along the edges of the mesh.

Notice that there are some elements that are partially filled and wet pixels outside of the mesh.

6 Conclusion

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

