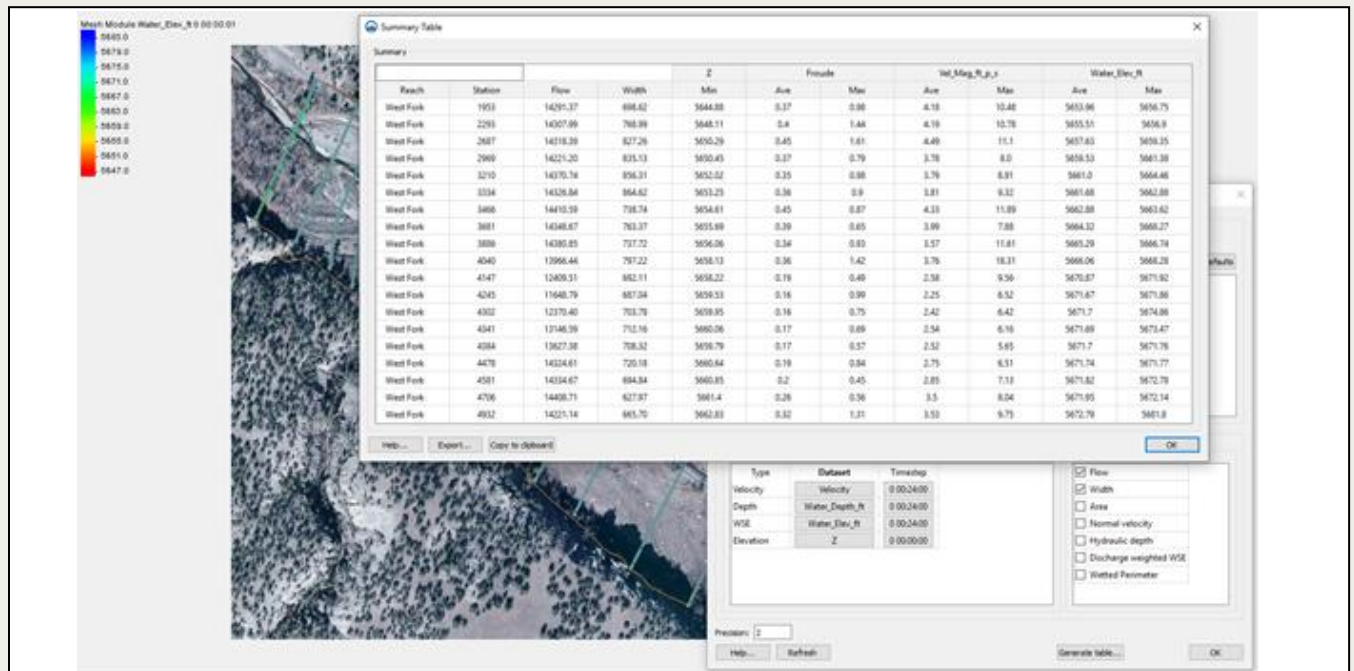


SMS 14.0 Tutorial

2D Summary Table

Compare Results Using the Summary Table in SMS



Objectives

Learn the process of making a summary table to compare the 2D hydraulic model results with 1D hydraulic model results.

Prerequisite Tutorials

- Overview
- Map Module
- Data Visualization

Required Components

- SMS Core
- SRH-2D Model & Interface

Time

- 10–20 minutes

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1 Introduction

This tutorial demonstrates generating a 2D summary table. USGS digital elevation models (DEMs) and Lidar data have become more available lately, making 2D modeling a viable option for many. A pre-built SRH-2D model and solution will be opened into SMS. The SRH-2D model has been constructed to show an example 2D model of the Gila River. Cross sections in the model were developed using HEC-RAS.

The SRH-2D model will be used to generate a summary table of the SRH-2D solution containing a summary of the results at each cross section.

Although results from an SRH-2D model will be used in this tutorial, the steps demonstrated apply equally to various other 2D hydraulic models.

2 Getting Started

Start by opening an existing project by doing the following:

1. Select *File* | **Open...** to bring up the *Open* dialog.
2. Select "Gila_River.sms" and click **Open** to import the file and exit the *Open* dialog.

This project contains an elevation scatter set, a background image, and map coverages for both the centerline and cross sections of the river. The projection for the area has already been set.

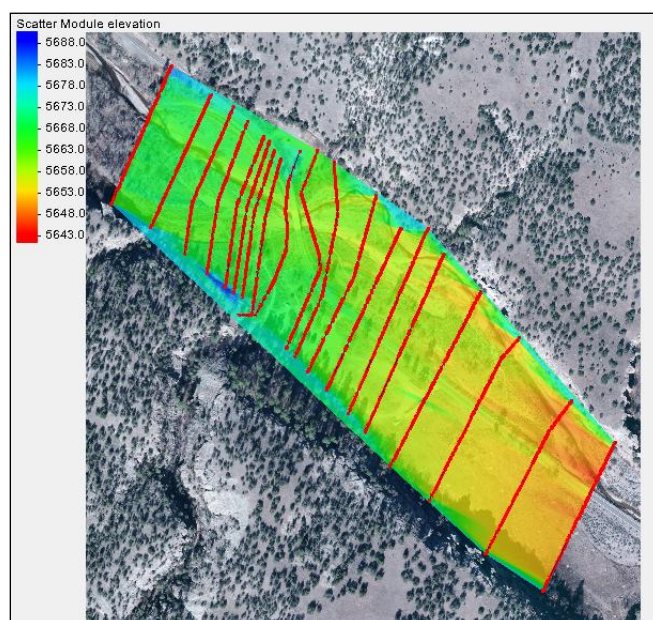


Figure 1 Initial project

3 Importing SRH-2D Model Results

The first step is importing the finite element mesh containing all of the ground elevation values. Then a model solution file containing the SRH-2D model results will be imported.

3. Turn off “ Gila XSEC Scatter” in the Project Explorer.

This turns off the display of the scatter points, including the scatter point contours.

4. Select *File* | **Open...** to bring up the *Open* dialog.
5. Select “Gila_2D_Mesh.h5” and click **Open** to import the file and exit the *Open* dialog.

The unstructured grid should appear similar to Figure 2.



Figure 2 The unstructured grid

6. Right-click on “ Mesh Data” and select **Display Options...** to bring up the *Display Options* dialog.
7. Select “2D Mesh” from the list on the left.
8. On the *2D Mesh* tab, click **All Off** and turn on *Contours* and *Mesh Boundary*.
9. On the *Contours* tab, in the *Contour method* section, select “Color Fill” from the first drop-down.
10. Enter “20” as the *Transparency* and click **OK** to close the *Display Options* dialog.

Analyze the mesh contours representing the elevations and notice that most of the terrain details have been captured in the mesh elevations.

The mesh contours generally match the features on the background image (Figure 3). The elevations found in the mesh are what SRH-2D used to compute a solution.

11. Select *File* | **Open...** to bring up the *Open* dialog.

12. Select “Q100yr_XMDF.h5” and click **Open** to import the file and exit the *Open* dialog.

This imports the SRH-2D solution, including additional “Gila_Mesh” datasets:

- “Froude”
- “Strs_lb_p_ft2”
- “Vel_Mag_ft_p_s”
- “Water_Depth_ft”
- “Water_Elev_ft”
- “Velocity”

Review the datasets as desired.

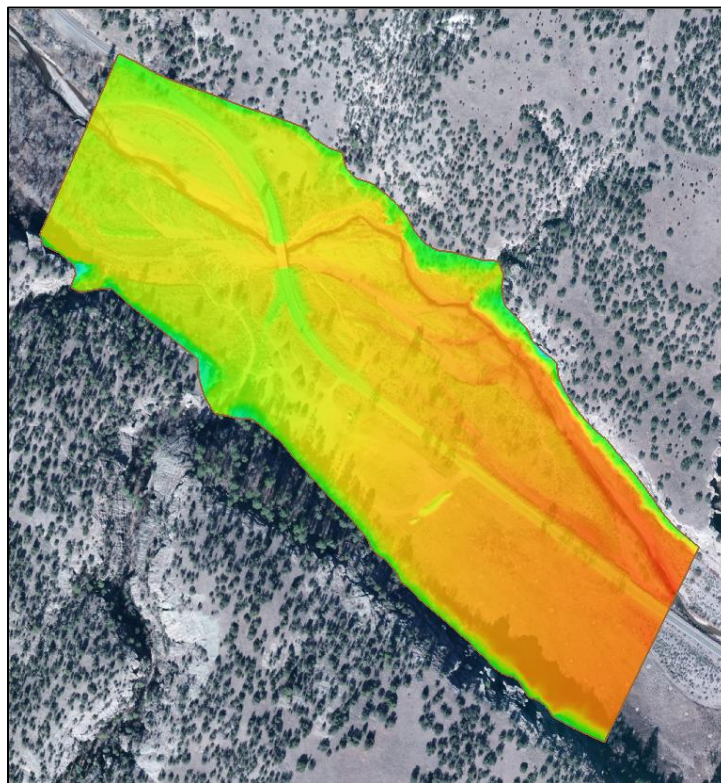


Figure 3 The mesh contours match the background image features

4 Generating a Results Summary Table

A summary table listing solution values for each cross section will now be generated. The report table created by SMS is similar to the HEC-RAS summary table report. SMS can report the minimum, maximum, and/or average values along a given cross section.

1. Right-click on “Gila_Export.RASexport XSEC” and select **Summary table...** to bring up the *Summary Table Options* dialog.
2. In the *Summary* section, click **Select...** to the right of *Data source* to bring up the *Select Tree Item* dialog.

The available mesh datasets should appear in the *Select Tree Item* dialog.

3. Select “Gila_Mesh” from the tree and click **OK** to close the *Select Tree Item* dialog.
4. Below *Data source*, select “Full cross section” from the drop-down.

Note that there are three different options for computing cross section values and reporting them in the table:

- “Full cross-section” computes values across the entire cross section.
- “Main channel only” computes values for just the channel portion of a cross section (between bank arcs).
- “Overbanks and main channel” computes values for the main channel portion of a cross section as well as the left and right overbanks.

The second and third options require the existence of bank arcs.

5. Check the box in the *Min* column on the *Z* row.
6. In the *Ave* and *Max* columns, check the boxes on the *Froude*, *Vel_Mag_ft_p_s*, and *Water_Elev_ft* rows.

Note that since the 2D hydraulic solution values vary along any given cross section, multiple values could be reported in the table. Options exist to report the minimum, maximum, and average value along a cross section.

7. For the datasets selected in step 6, make sure the value for each in the *Time step* column is “0 00:24:00”.

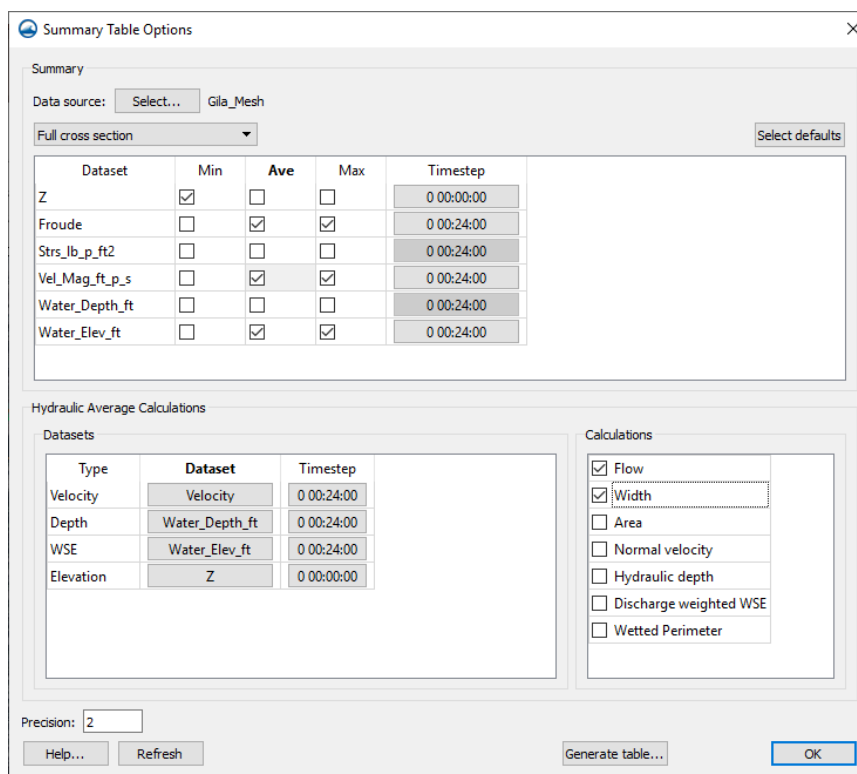
SMS uses the last time step in the dataset as a default.

8. In the *Advanced Calculations* section, in the *Datasets* section, make sure the fields match the following table:

Type	Dataset	Timestep
Velocity	Velocity	0 00:24:00
Depth	Water_Depth_ft	0 00:24:00
WSE	Water_Elev_ft	0 00:24:00
Elevation	Z	0 00:00:00

9. In the *Calculations* section, turn on *Flow* and *Width*.

The *Summary Table Options* dialog should appear as in Figure 4.



Summary Table Options

Summary

Data source: Gila_Mesh

Full cross section

Dataset	Min	Ave	Max	Timestep
Z	☒	☐	☐	0 00:00:00
Froude	☐	☒	☒	0 00:24:00
Strs_lb_p_ft2	☐	☐	☐	0 00:24:00
Vel_Mag_ft_p_s	☐	☒	☒	0 00:24:00
Water_Depth_ft	☐	☐	☐	0 00:24:00
Water_Elev_ft	☐	☒	☒	0 00:24:00

Hydraulic Average Calculations

Datasets

Type	Dataset	Timestep
Velocity	Velocity	0 00:24:00
Depth	Water_Depth_ft	0 00:24:00
WSE	Water_Elev_ft	0 00:24:00
Elevation	Z	0 00:00:00

Calculations

☒ Flow

☒ Width

☐ Area

☐ Normal velocity

☐ Hydraulic depth

☐ Discharge weighted WSE

☐ Wetted Perimeter

Precision:

Figure 4 Summary Table Options dialog

10. Click **Generate table...** to bring up the *Summary Table* dialog.

The *Summary Table* dialog should appear as in Figure 5.

Summary Table

Summary

				Z	Froude		Vel_Mag_ft_p_s		Water_Elev_ft	
Reach	Station	Flow	Width	Min	Ave	Max	Ave	Max	Ave	Max
West Fork	1953.98	14291.37	698.62	5644.88	0.37	0.98	4.18	10.48	5653.96	5656.75
West Fork	2293.89	14307.99	768.99	5648.11	0.4	1.44	4.19	10.78	5655.51	5656.9
West Fork	2687.04	14318.39	827.26	5650.29	0.45	1.61	4.49	11.1	5657.63	5659.35
West Fork	2969.39	14221.20	835.13	5650.45	0.37	0.79	3.78	8.0	5659.53	5661.38
West Fork	3210.47	14370.74	856.31	5652.02	0.35	0.98	3.79	8.91	5661.0	5664.46
West Fork	3334.76	14326.84	864.62	5653.25	0.36	0.9	3.81	9.32	5661.68	5662.88
West Fork	3466.12	14410.59	738.74	5654.61	0.45	0.87	4.33	11.89	5662.88	5663.62
West Fork	3681.02	14348.67	763.37	5655.69	0.39	0.65	3.99	7.88	5664.32	5668.27
West Fork	3886.94	14380.85	737.72	5656.06	0.34	0.93	3.57	11.61	5665.29	5666.74
West Fork	4040.12	13966.44	797.22	5658.13	0.36	1.42	3.76	18.31	5666.06	5668.28
West Fork	4147.4	12409.51	692.11	5658.22	0.19	0.49	2.58	9.56	5670.87	5671.92
West Fork	4245.76	11648.79	687.04	5659.53	0.16	0.99	2.25	6.52	5671.67	5671.86
West Fork	4302.19	12370.40	703.78	5659.95	0.16	0.75	2.42	6.42	5671.7	5674.86
West Fork	4341.36	13146.59	712.16	5660.06	0.17	0.69	2.54	6.16	5671.69	5673.47
West Fork	4384.63	13627.38	708.32	5659.79	0.17	0.57	2.52	5.65	5671.7	5671.76
West Fork	4478.63	14324.61	720.18	5660.64	0.19	0.84	2.75	6.51	5671.74	5671.77
West Fork	4581.12	14334.67	694.84	5660.85	0.2	0.45	2.85	7.13	5671.82	5672.78
West Fork	4706.27	14408.71	627.97	5661.4	0.26	0.56	3.5	8.04	5671.95	5672.14
West Fork	4932.6	14221.14	665.70	5662.83	0.32	1.31	3.53	9.75	5672.79	5681.8

Help...

Export...

Copy to clipboard

OK

Figure 5 Summary Table dialog

Notice that the summary table options selected in steps 2–9 match the columns shown for each cross section in Figure 5. This summary table can be exported as a text file or copied to the clipboard and pasted into a spreadsheet program for analysis. Buttons for exporting and copying are found in the lower left corner of the *Summary Table* dialog.

At this point, HEC-RAS could also be opened and a summary table generated there. The summary table generated by HEC-RAS will have some similarities with the summary table created by SMS from the SRH-2D data. Differences found in the

summary tables would be due to many different factors as these two approaches to hydraulic modeling are very different.

11. When done viewing and exporting the summary table contents, click **OK** to close the *Summary Table* dialog.
12. Click **OK** to close the *Summary Table Options* dialog.

5 Saving a Project File

All the data in this project can be saved to an SMS project file. When a project file is saved, separate files are created for the map, scatter data, and mesh data. The project file is a text file that references the individual data files.

To save all this data for use in a later session:

1. Select *File* | **Save As...** to bring up the *Save As* dialog.
2. Select "Project Files (*.sms)" from the *Save as type* drop-down.
3. Enter "Gila_1D2D.sms" as the *File name*.
4. Click **Save** to save the project files and close the *Save As* dialog.

6 Conclusion

This concludes the "2D Summary Table" tutorial. Topics covered in this tutorial included:

- Importing and viewing an SRH-2D model
- Generating a summary table of 2D model results along each cross section
- Saving a project file

If desired, continue to experiment with the SMS interface or quit the program.