

## Creating bathymetric mesh using field surveyed channel elevation data.

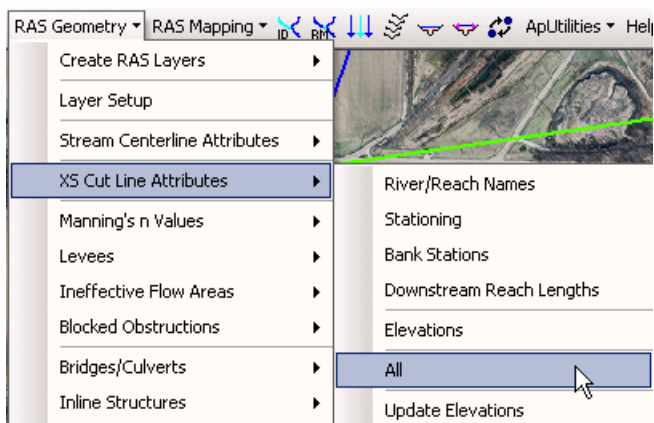
*Additional information is available in the GeoRAS manual and in the tutorial document below. The tutorial document describes how to download the tool. The tutorial also describes how to run the tool but steps below describes in more detail how to run the tool and shows some modified use of the tool.*

[http://web.ics.purdue.edu/~vmerwade/research/bathymetry\\_tutorial.pdf](http://web.ics.purdue.edu/~vmerwade/research/bathymetry_tutorial.pdf).

1. Filter the field data if needed with Haversine (or something similar) program to about 50 - 100 points per xsection. Project the field data to match the rest of base GIS data (i.e. State Plane West/East).
2. Start the GeoRAS geometry process to create center line, bank lines, flowpath lines and xscutlines as you would do normally. Be sure to follow streamflow direction (i.e. upstream to downstream, left to right bank...).



Run all the “RAS Geometry” steps (as normal) prior to and including the highlighted step below.



Make sure “Station” column is populated in XScutlines table.

Table						
XScutLines						
	Shape_Length	HydroID	Station	River	Reach	LeftBank
	20108.44914	7	19062.33	white	reach1	0.47867
	18708.601547	8	17780.54	white	reach1	0.50479
	17434.154268	9	16251.5	white	reach1	0.47899
	17365.341326	10	15079.73	white	reach1	0.55065
	15878.007764	11	14003.58	white	reach1	0.62503
	14577.279433	12	13138.11	white	reach1	0.66523
	12738.86339	13	11847.03	white	reach1	0.73241
	11149.379549	14	10865.63	white	reach1	0.77405
	10715.03437	15	9907.294	white	reach1	0.67825
	10696.043768	16	8701.413	white	reach1	0.5495
	9775.336453	17	6959.407	white	reach1	0.54806

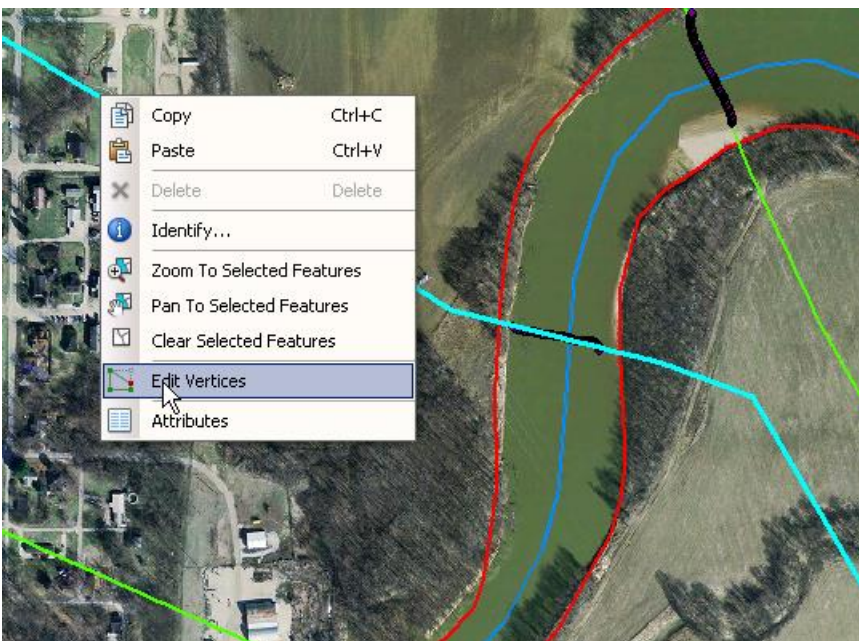
- Update Xscutline3D layer with field surveyed channel elevation data by using “Update Elevations” tool in GeoRAS (see the second image in previous page). More details of the tool can be found in GeoRAS manual.

- When it's done, you should see a message similar to one below and graphics to indicate how the buffer and the points used in updating elevation.

Status - Update XS Cutlines Profiles		
Start Time	Type	Message
4/15/2013 3:15:32 PM	Information	Updated elevations for XS feature OID : 37 at station : 18350.62
4/15/2013 3:15:41 PM	Information	Updated elevations for XS feature OID : 38 at station : 16760
4/15/2013 3:15:50 PM	Information	Updated elevations for XS feature OID : 39 at station : 15755.35
4/15/2013 3:15:57 PM	Information	Updated elevations for XS feature OID : 40 at station : 14369.44
4/15/2013 3:16:04 PM	Information	Updated elevations for XS feature OID : 41 at station : 13571.29
4/15/2013 3:16:09 PM	Information	Updated elevations for XS feature OID : 42 at station : 12568.47
4/15/2013 3:16:13 PM	Information	Updated elevations for XS feature OID : 43 at station : 11389.87
4/15/2013 3:16:16 PM	Information	Updated elevations for XS feature OID : 44 at station : 10398.11
4/15/2013 3:16:20 PM	Information	Updated elevations for XS feature OID : 45 at station : 9186.51
4/15/2013 3:16:23 PM	Information	Updated elevations for XS feature OID : 46 at station : 8185.457
4/15/2013 3:16:26 PM	Information	Updated elevations for XS feature OID : 47 at station : 7371.029
4/15/2013 3:16:29 PM	Information	Updated elevations for XS feature OID : 48 at station : 5590.176
4/15/2013 3:16:32 PM	Information	Updated elevations for XS feature OID : 49 at station : 4400.653
4/15/2013 3:16:34 PM	Information	Updated elevations for XS feature OID : 50 at station : 3200.259
4/15/2013 3:16:36 PM	Information	Updated elevations for XS feature OID : 51 at station : 2193.414
*		



- If you would like to check to see if the field data have been applied, you can check in editor mode. Select one of the “XSCutLines3DUpdated” lines; right click on the highlighted line and select “Edit Vertices”;

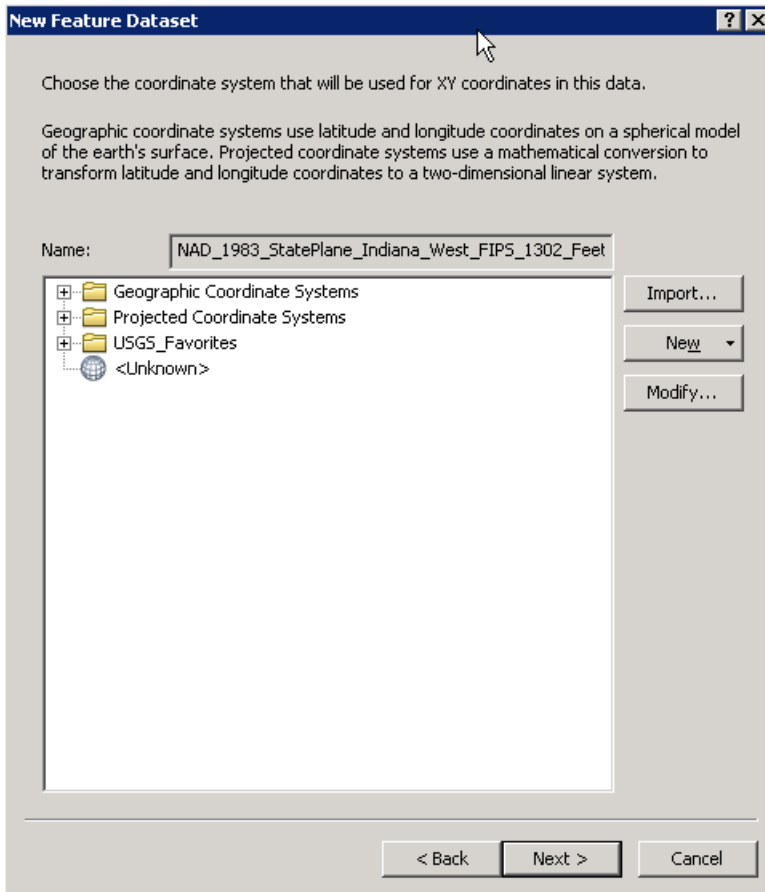


- Right click on one of the vertices and select “Sketch Properties”.

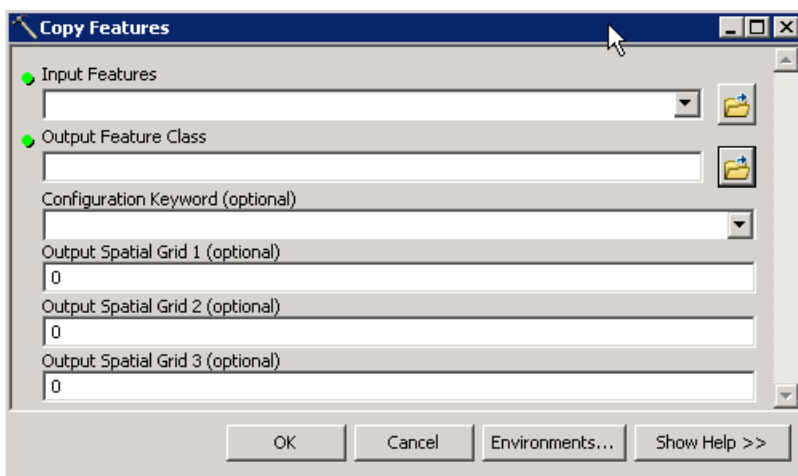




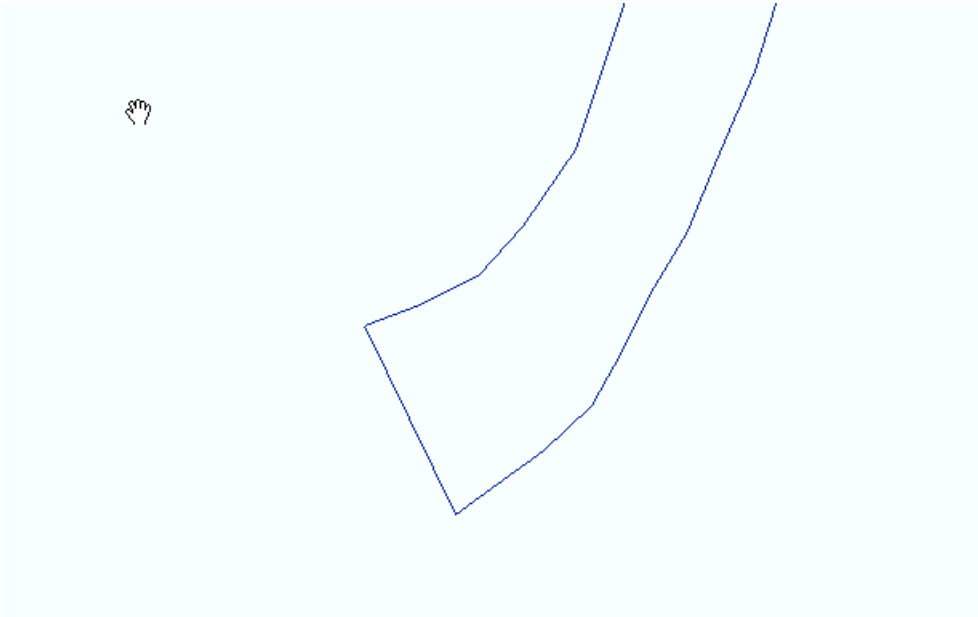
- Before you start using the bathymetry mesh tool, in a new folder/workspace, you will need to create new personal geo-database and then create new feature dataset using DEM layer as a reference for coordinate system (As you copy/create new set of layers, add these layers to a new ArcMap session for bathymetry mesh tool process).



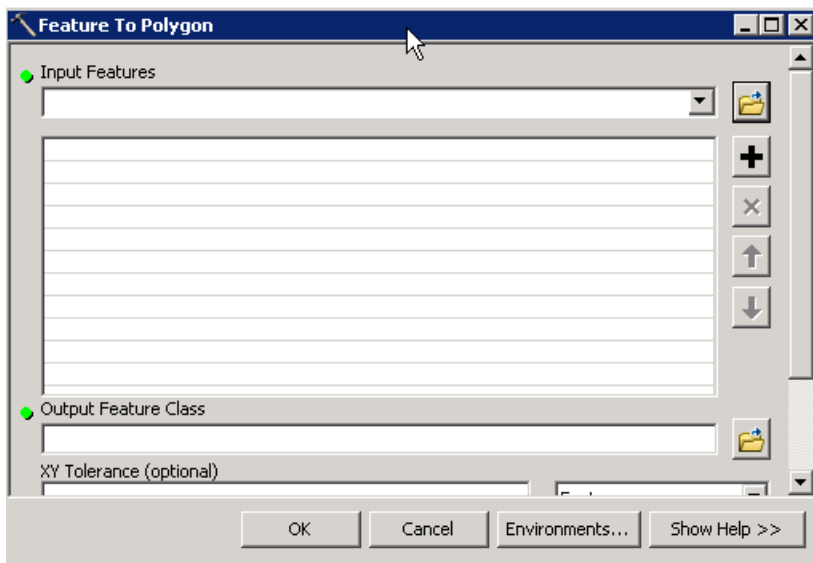
- Copy "River" and "Banks" (as "Banks\_line") layers from GeoRAS database to Mesh database by using "Copy Features" toolbox.



6. Banks line needs to be converted to polygon for mesh tool to work. Edit “Banks\_line” by connecting the lines at both upstream and downstream ends.



- Convert “Banks\_line” to “Banks\_poly” by using “Feature to polygon” toolbox.



7. Create empty/new “Mesh” layer in the new geo-database in ArcCatalog; be sure to check mark M and Z values. And add fields called “ProfileID” and “CrossID” as shown below.

**New Feature Class** [?] [X]

Name:

Alias:

Type

Type of features stored in this feature class:

Geometry Properties

☒ Coordinates include M values. Used to store route data.

☒ Coordinates include Z values. Used to store 3D data.

< Back   Next >   Cancel

Field Name	Data Type
OBJECTID	Object ID
SHAPE	Geometry
ProfileID	Long Integer
CrossID	Long Integer
SHAPE_Length	Double

- To copy “Xscutline3DUpdated” layer and copy all of its attribute table, first use “Create Feature Class” toolbox create empty “Xsection3D” layer (with m and z values enabled) using “Xscutline3DUpdated” layer as a template; then append the “Xscutline3DUpdated” to “Xsection3D”.

**Create Feature Class**

Feature Class Location  
[Empty text box] [Folder icon]

Feature Class Name  
[Empty text box]

Geometry Type (optional)  
POLYLINE

Template Feature Class (optional)  
[Empty text box] [Folder icon]


Has M (optional)  
ENABLED

Has Z (optional)  
ENABLED

Coordinate System (optional)  
Unknown [Folder icon]

Geodatabase Settings (optional)

OK Cancel Environments... Show Help >>

**Append**

Input Datasets  
[Empty text box] [Folder icon]


Target Dataset  
[Empty text box] [Folder icon]

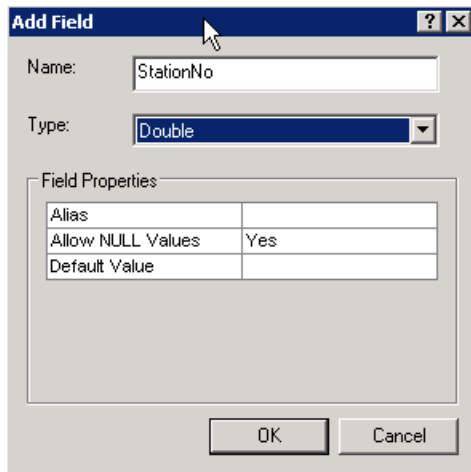
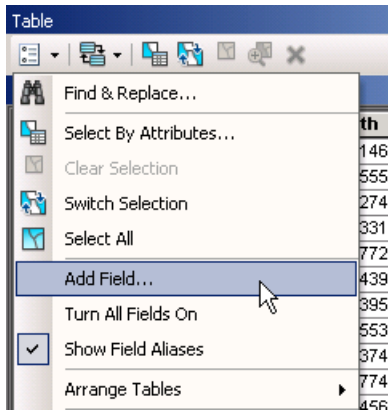
Schema Type (optional)  
TEST

Field Map (optional)

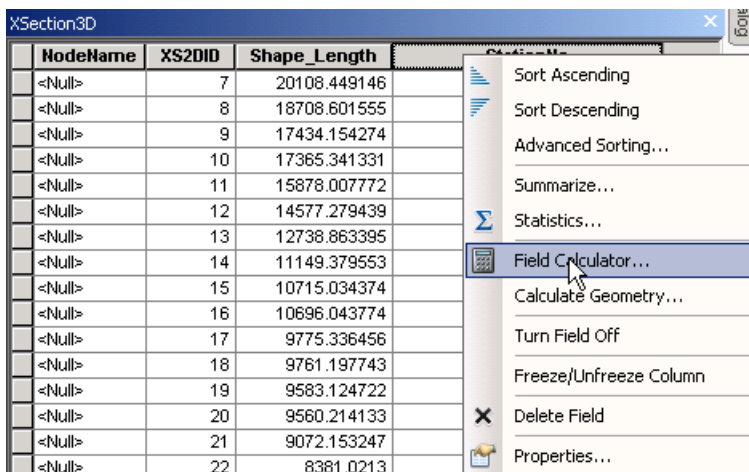

OK Cancel Environments... Show Help >>



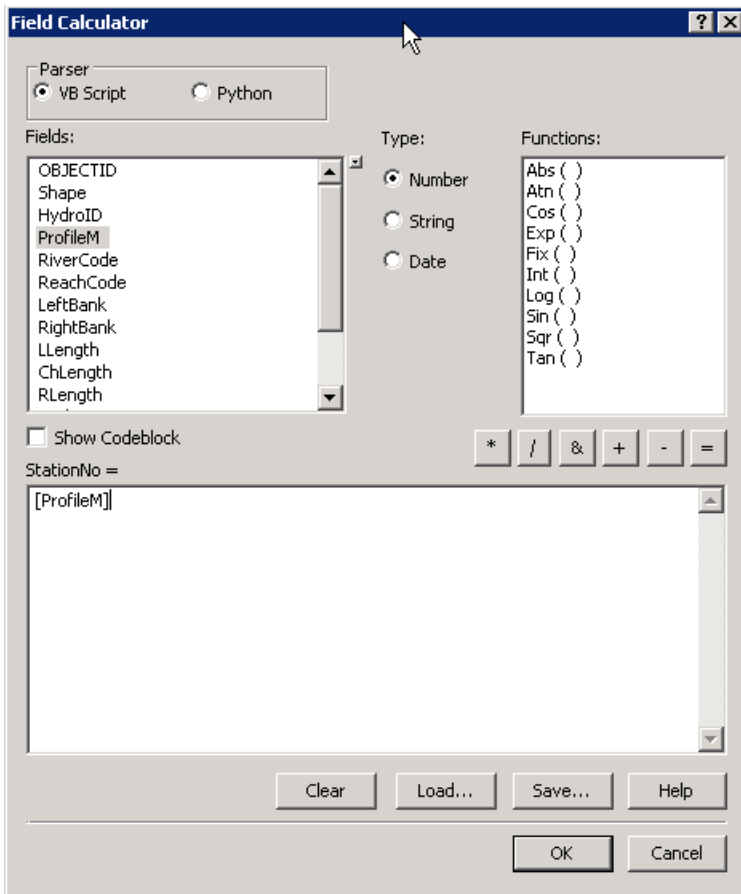
- In order for mesh tool to work, you will need to add a field called "StationNo" in attribute table of "Xsection3D" layer and copy the values from "Station" (aka ProfileM) column.



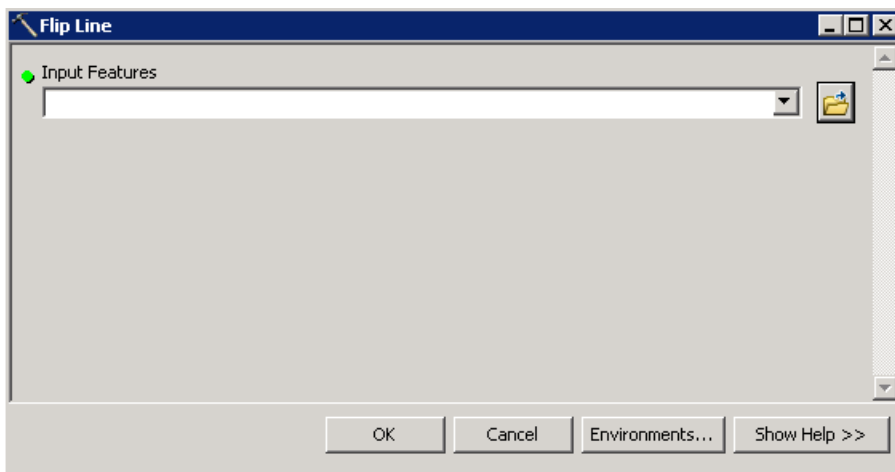
- Then right click on the "StationNo" column and select "Field Calculator".



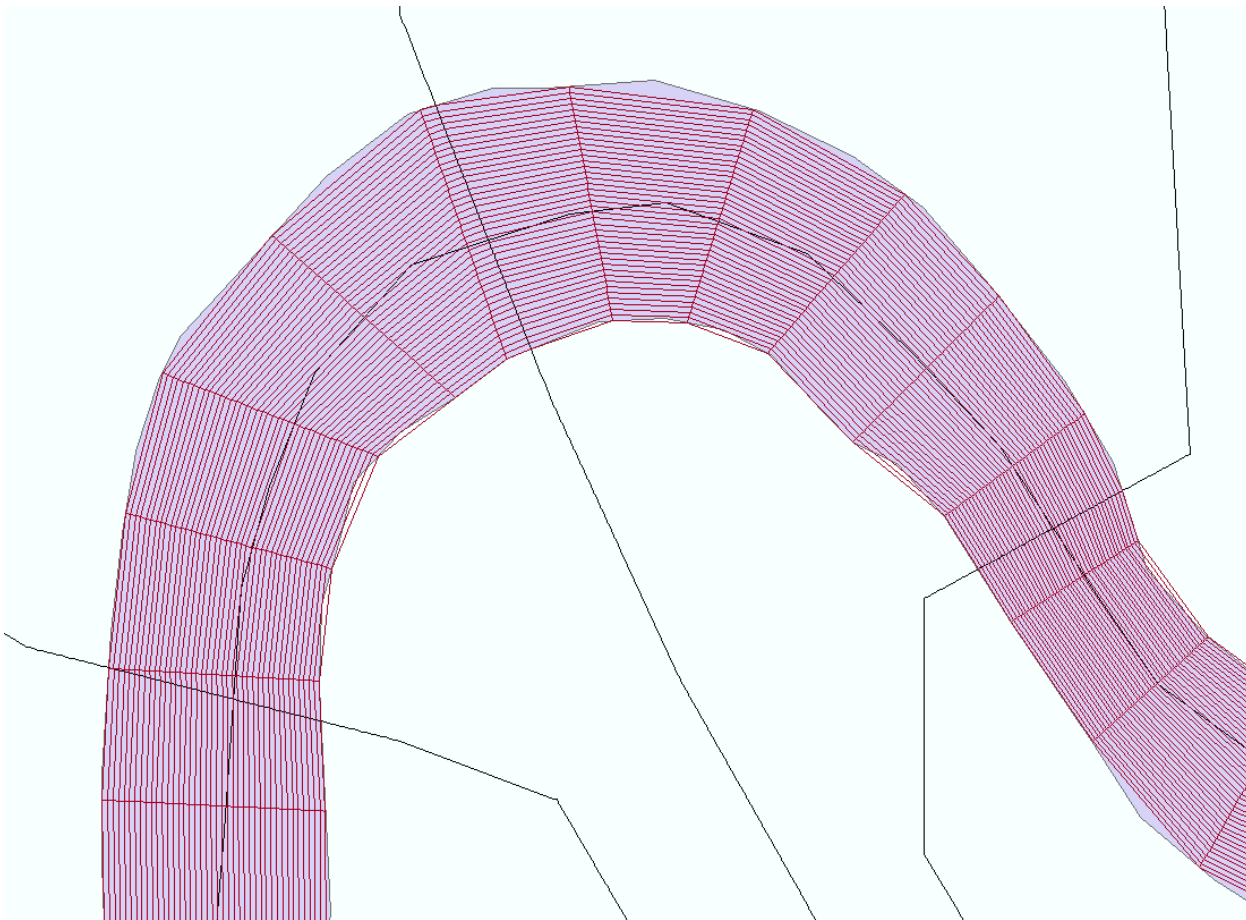
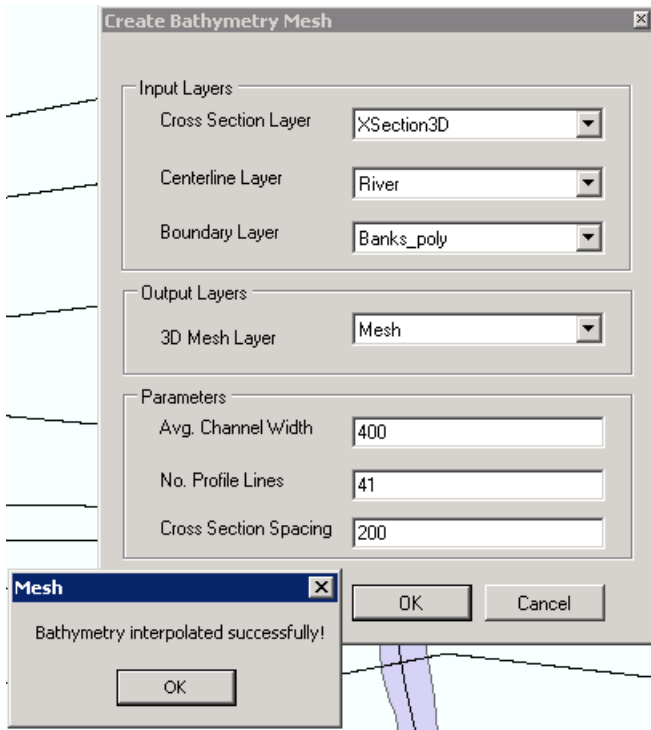
- In "Field Calculator", double click "ProfileM" (aka Station) and OK to copy station values to "StationNo" column.



10. In order to run mesh tool properly, you will need to flip directions of the “River” and “Xsection3D” lines before running the mesh tool by using “Flip Line” toolbox.



11. You are now ready run mesh tool. Input appropriate parameters for the tool. More details are available in the tutorial here ([http://web.ics.purdue.edu/~vmerwade/research/bathymetry\\_tutorial.pdf](http://web.ics.purdue.edu/~vmerwade/research/bathymetry_tutorial.pdf)).



12. Elevation data points (x, y, z) from the mesh can be extracted by using "Feature Class Z to ASCII" toolbox (if any of you know of better toolbox, please let me know).

```

mesh_pts1_orig.txt - Notepad
File Edit Format View Help
2909914.38556375 1298740.43957609 451.90510000
2910095.23986084 1298831.52666426 452.39210000
2910255.63750592 1298974.11725834 452.83590000
2910439.27460584 1299100.53465643 453.27980000
2910643.92577134 1299214.42517668 453.72360000
2910900.77991642 1299282.29216693 454.16740000
2911157.21641142 1299262.43918826 454.61130000
2911341.94110759 1299192.01839735 454.74960000
END
2
2907813.96489584 1287086.88939243 445.20760000
2907820.22144501 1287100.56029684 445.22110000
2907894.94931392 1287283.36209659 445.26740000
2907944.07946501 1287471.36139251 445.31370000
2907983.06101434 1287660.45615868 445.36000000
2908015.22433584 1287851.02762793 445.40630000
2908034.60848342 1288046.32120059 445.45260000
2908043.54612959 1288216.42748768 445.49070000

```

13. You will need to edit/delete the file to have xyz fields with NO additional row like shown above. Open the edited txt file in excel and add xyz column headings.

	A	B	C	D	E	F
1	x	y	elev			
2	2907805.81399350	1287091.73255859	452.30			
3	2907811.46555701	1287103.28142001	452.13			
4	2907886.91094417	1287285.66163268	451.55			
5	2907936.21432325	1287473.27772726	450.96			
6	2907975.43734192	1287661.93122134	450.38			
7	2908007.69416717	1287852.12801943	449.79			
8	2908027.05633317	1288047.22605443	449.21			
9	2908035.98741767	1288217.38581909	448.73			
10	2908037.68032767	1288235.16235834	448.82			
11	2908026.15508825	1288402.82868968	449.35			

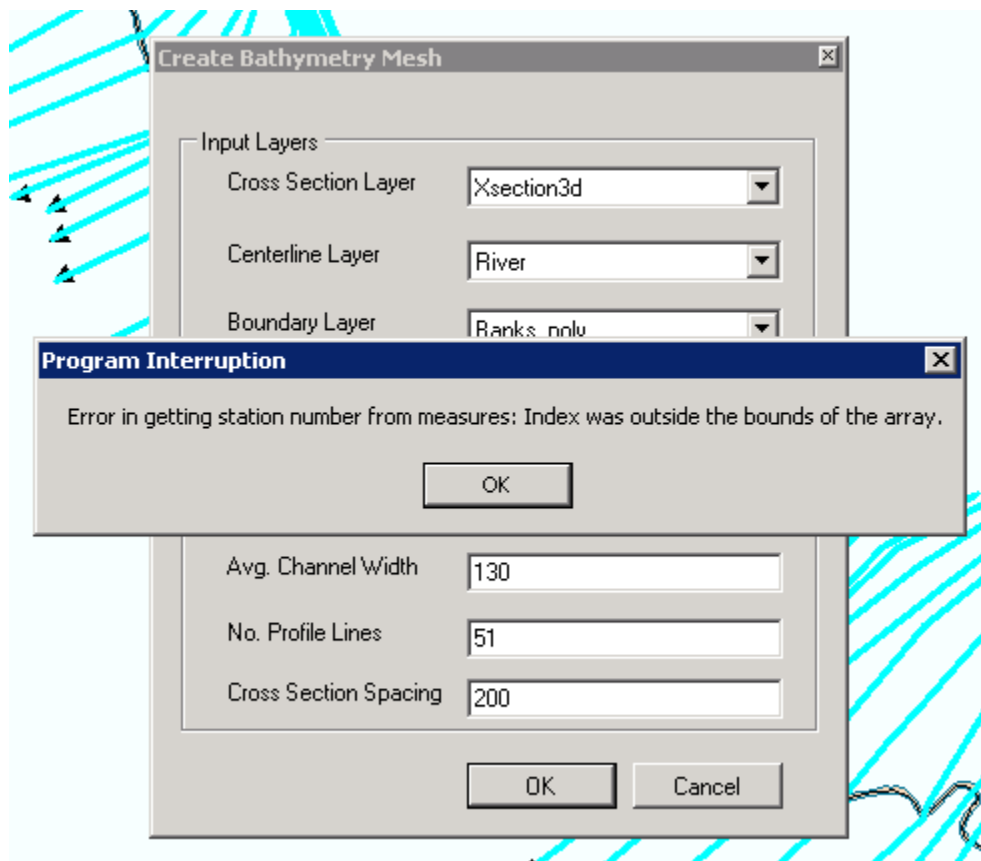
14. Create a point layer from the mesh points. Then add the point layer back in the GeoRAS ArcMap session (you may need to edit/delete some of the points depending on how close they are to each other). Add additional XScutlines for interpolated cross sections as needed in between the existing XScutlines. Re-run the GeoRAS geometry process as before, then “Update Elevations” using the mesh point layer to incorporate field surveyed and interpolated channel elevation data.





## Trouble Shooting

If you see an error message like this one below, click OK each one by one and at the end, you should get a message saying that tool ran successfully.



## Contact Information

If there are any questions regarding this document, please contact the listed information below:

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