wood.

Take a Closer Look at the Water Surface TIN

- Expect the "unexpected"

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Presentation Audience Survey ("Take a Closer Look at the Water Surface TIN")

To complete the survey, go to **PollEv.com/yukunxing921**
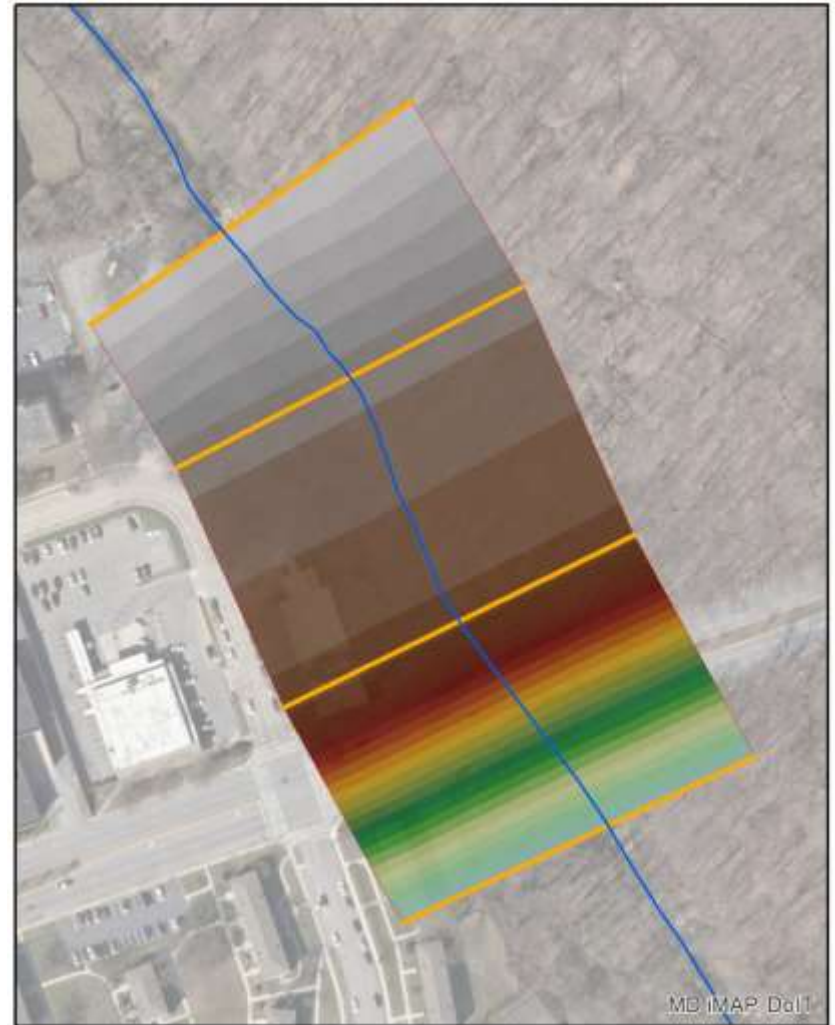
0 surveys done
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1-D HEC-RAS model and mapping

- 1-D HEC-RAS model:
  - Water Surface (WS) Elevation (WSE): known only at XS lines
- Floodplain mapping requirement:
  - Mapped floodplain needs to be continuous
- To bridge the gap, assumptions on WSE between XSs
  - between the WSEs of the two bounding XSs
  - changing linearly (e.g., along the flow path)
- The GIS mapping approach based on the assumptions:
  - Create a continuous water surface TIN using model XS lines and a bounding polygon
  - Intersect the water surface with the ground surface to obtain floodplain boundary

Expectations and reality

- Expectations
  - At XSs TIN value is consistent with known WSE
  - Off XSs TIN value follows the two assumptions
- Reality
  - At XSs, as expected
  - Between XSs:
    - As expected under scenarios where "best practices" (perpendicular to flow etc.) are employed in XS layout
    - Under certain scenarios it is not the case

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WS TIN "bleeding" – example 1

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

- Drastic meander
- "Bleeding" WS TIN
- Most asked question - Is a clip polygon used?
- Misconception: "clip polygon stops interpolation across its boundary"
- A clip polygon in TIN creation excludes data outside it from consideration and defines the TIN boundary, nothing more
- Solution: add more XS lines with appropriately interpolated WSE, or create two WS TINs separately

WS TIN "bleeding" – example 2

- Property owner wants to confirm inundation
- Significant and abrupt changes in length of XS lines causes "bleeding"
- Solution: shortened XS lines and updated WS TIN
- Property outside corrected ZONE A
- "Bleeding": when values of the WS TIN between two XSs are results of interpolation involving WSE of other XSs.

Even when there is no "bleeding"
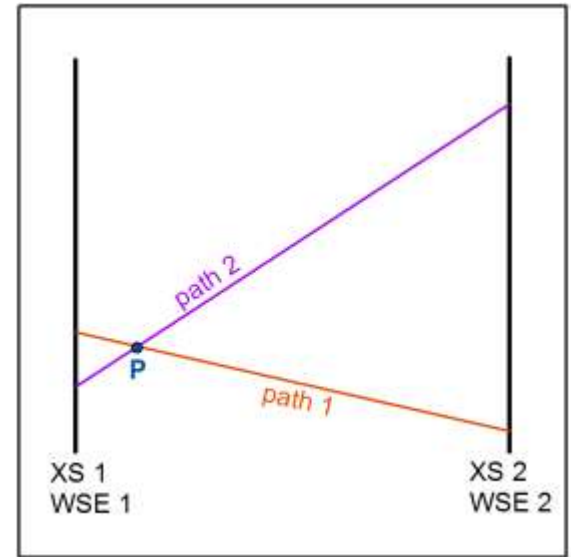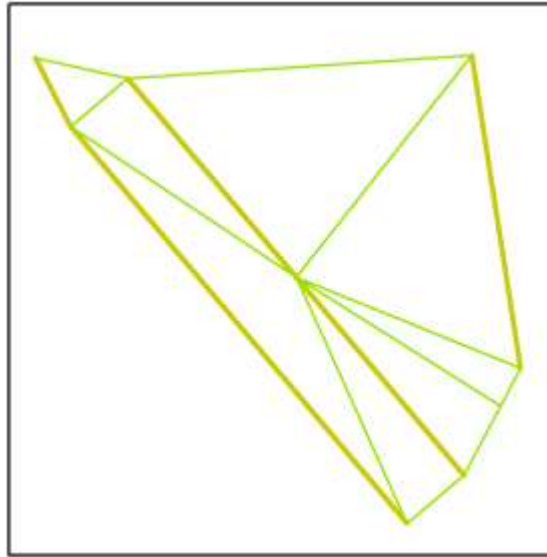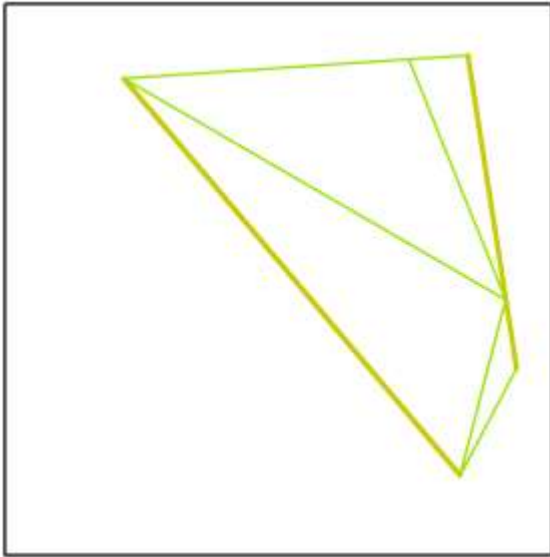
- WS TIN between two XSs can be impacted by simply including an additional XS, even when it doesn't cause "bleeding"

- Different TIN Triangle constructions, different "paths" of interpolation, different results with nonparallel XS

- Parallel XSs – path of interpolation has no impact

Ideal vs. non-ideal XS lines (mapping perspective)

- Ideal XS lines layout
  - Straight
  - Consistent length
  - Parallel
  - Not much "lateral" shift in line position
  - Perpendicular to flow
- Non-ideal example
  - Severely bent XS line
  - Not perpendicular to flow
  - WS TIN far from expected
  - Poor mapping results
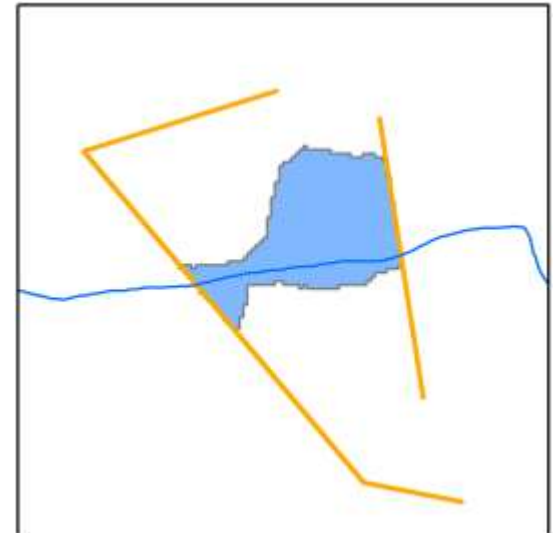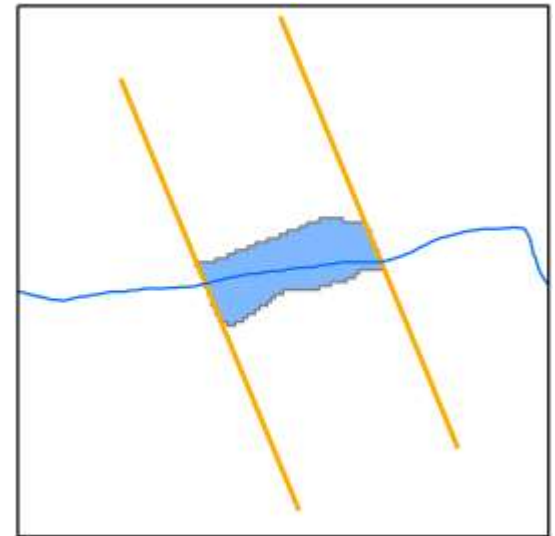
Modify XS lines before WS TIN creation if necessary
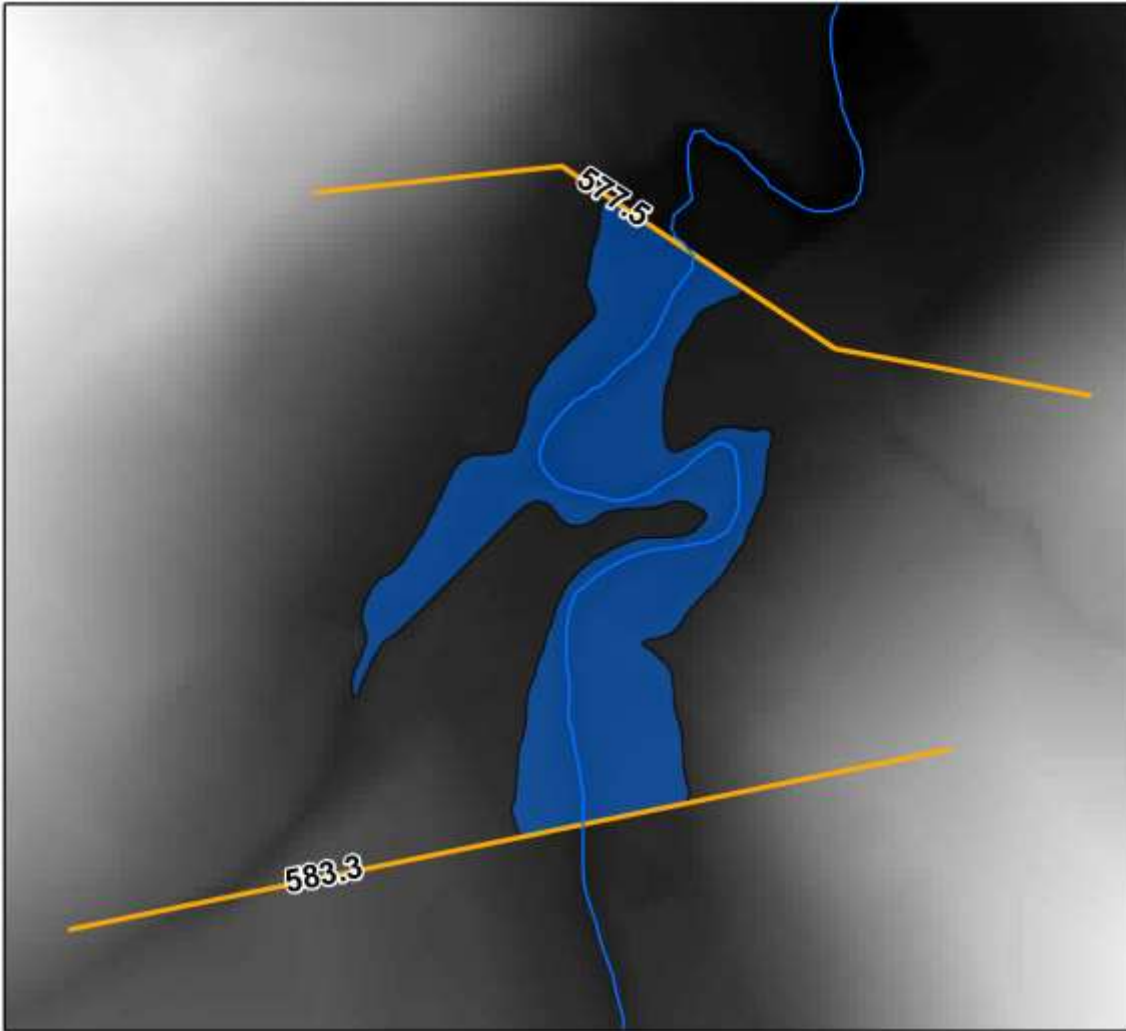
- Bent and nonparallel XS lines
- Resulting TIN (pattern of color bands)
- Modifications
  - Bends can be "straightened" (outside floodplain)
  - Enforce desired interpolation by adding more lines with manually interpolated WSE
- Significant difference in results

Summary

- WS TIN can be negatively impacted by many factors
- People are often surprised that the "bleeding" effect can even happen
- Best practice for model XS line may not be best practice for mapping
- Increased effort on batch and automating some of the modeling and mapping processes could reduce the chance to notice and address these issues
- Always expect the "unexpected", and review the WS TIN
- Certain issues can and should be resolved before mapping by modifying and/or adding XS lines
- Strike a balance between accuracy and effort. Severity of impact, degree of development, and level of effort for corrective action

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Questions?

A presentation by Wood.