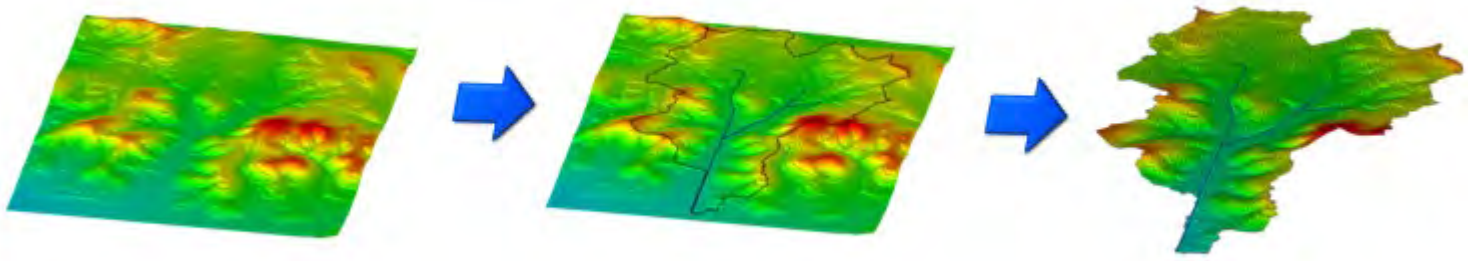
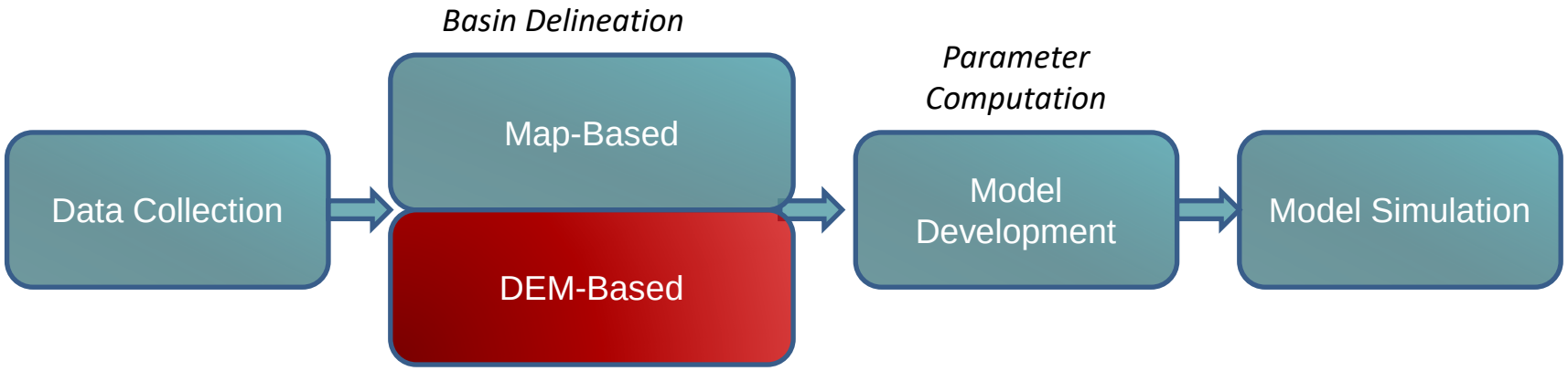
Watershed Modeling With DEMs



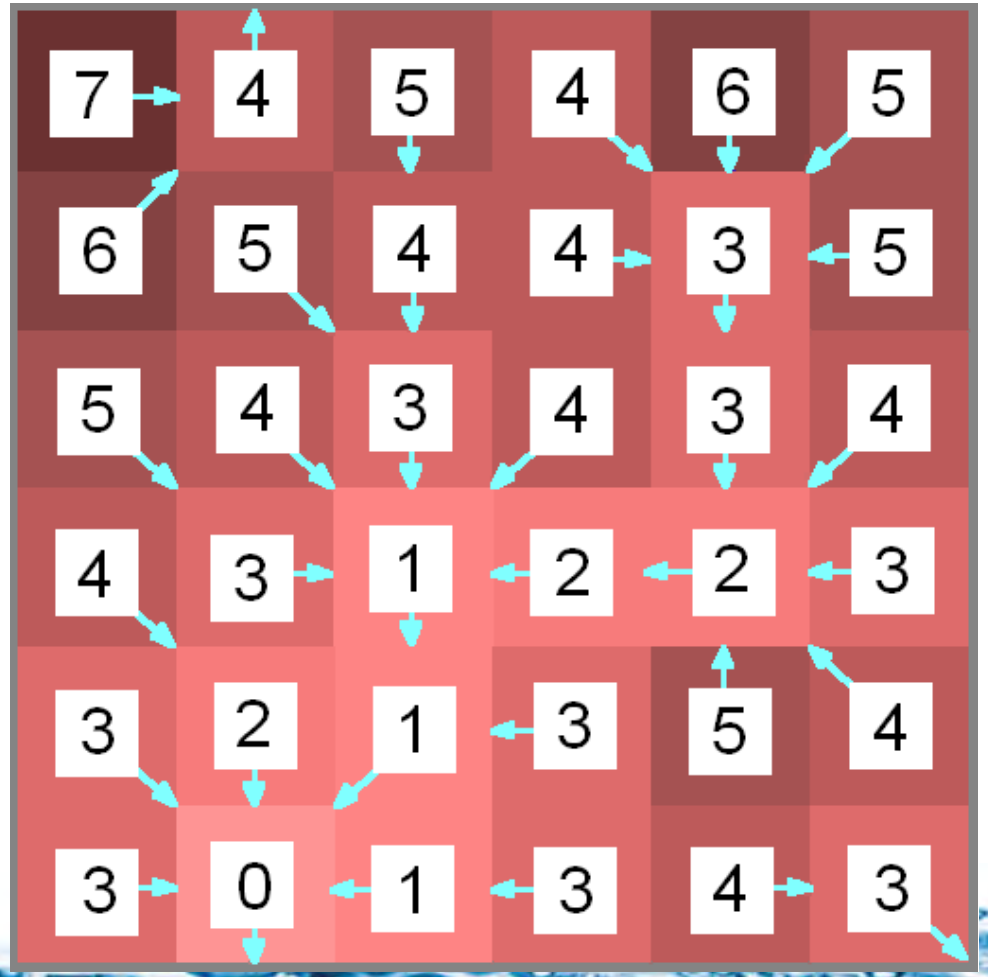
Lesson Learning Outcomes

- Upon completion of this lesson, we will be able to:
  - Use DEMs for basin delineation.
  - Use WMS to compute geometric basin data from a delineated basin.

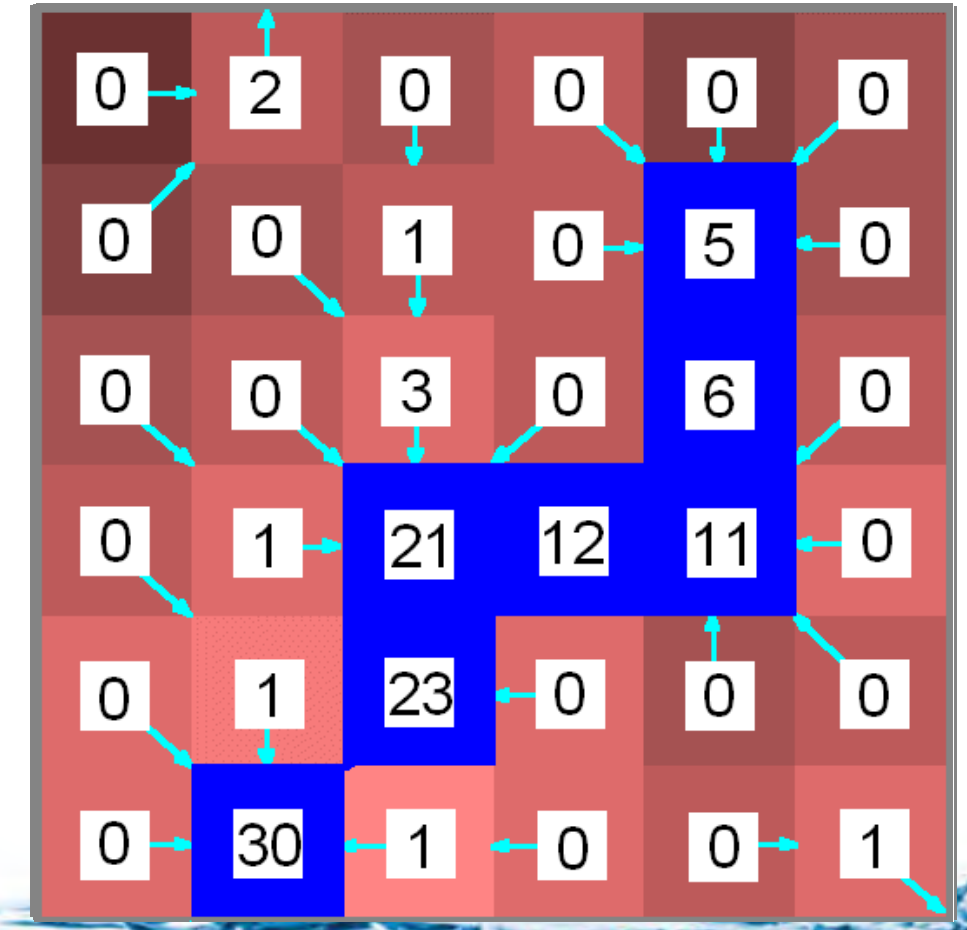
Hydrologic Modeling Workflow



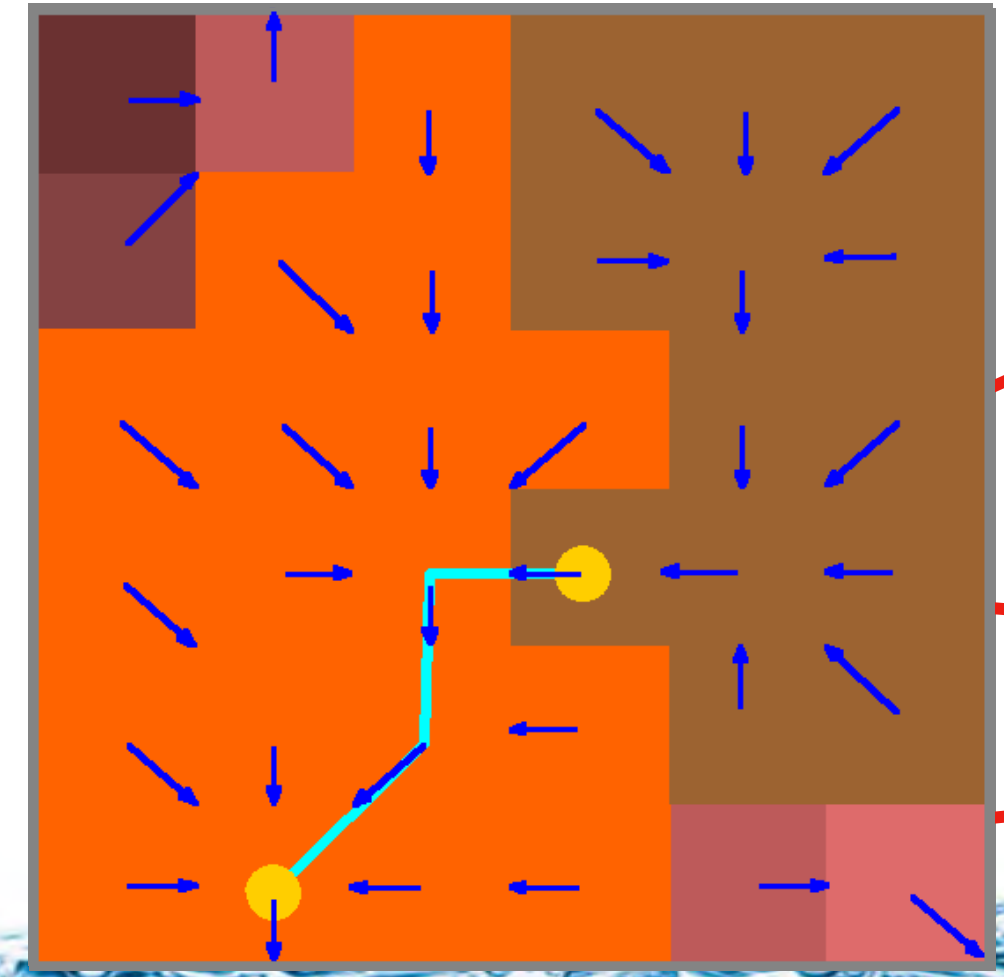
Flow Directions



Flow Accumulation



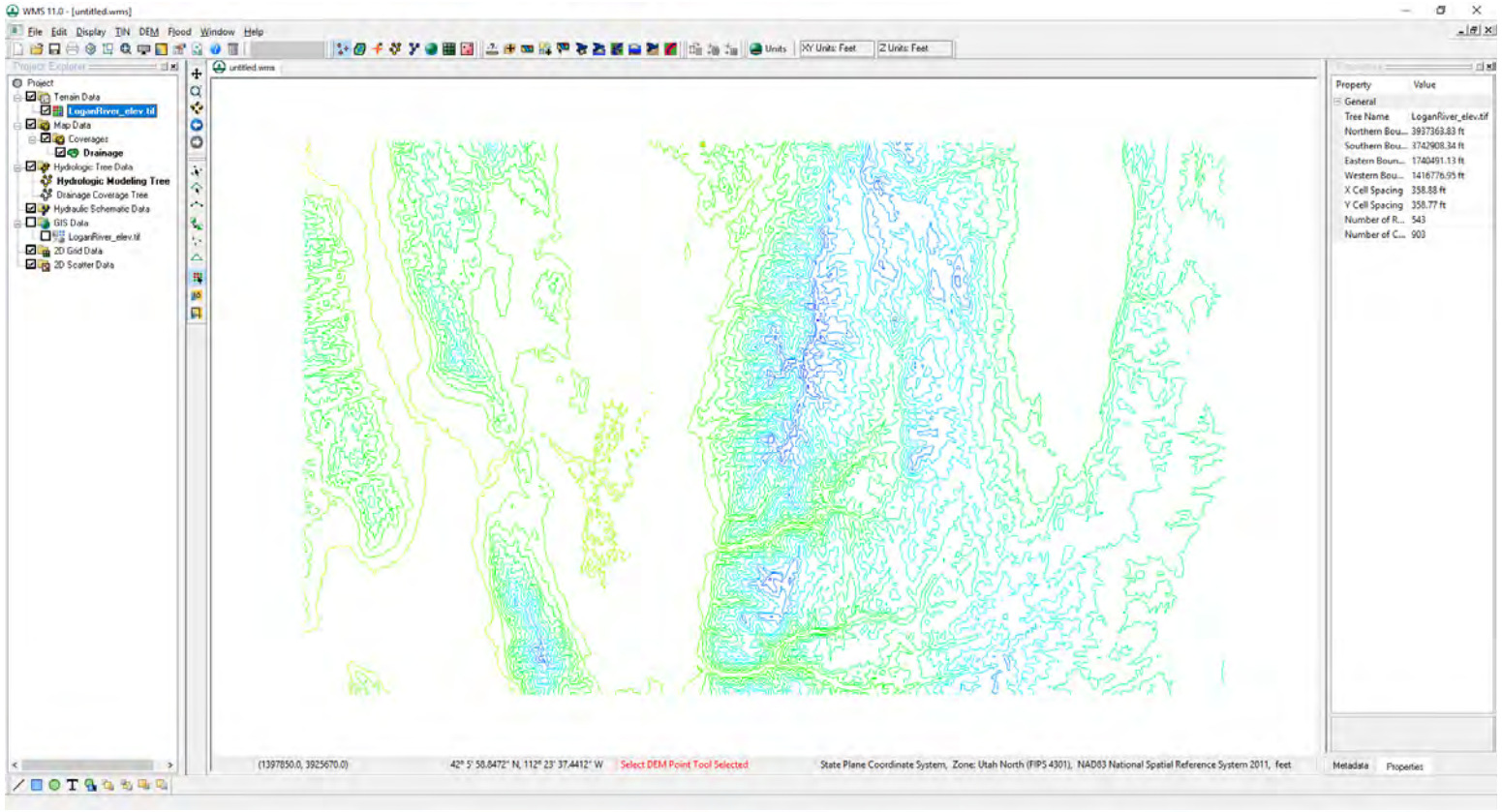
Basin Delineation



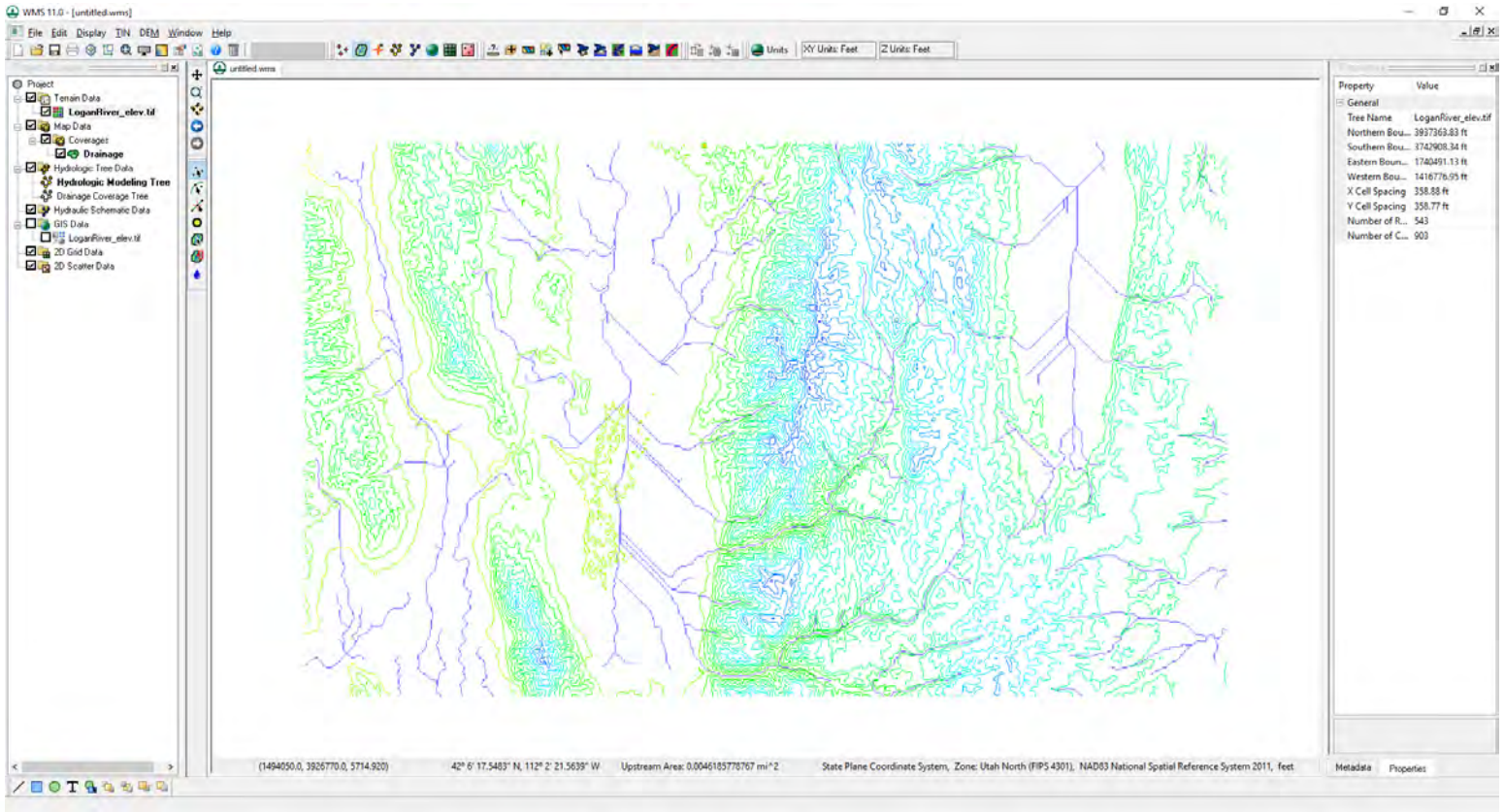
7 Steps in WMS for DEM Delineation

1. Read Elevations
2. Compute Flow Directions and Accumulations with TOPAZ
3. Define Basin Outlet(s)
4. Convert DEM Streams to Feature Objects
5. Define Basin(s)
6. Convert Boundaries to Polygons
7. Compute Basin Parameters

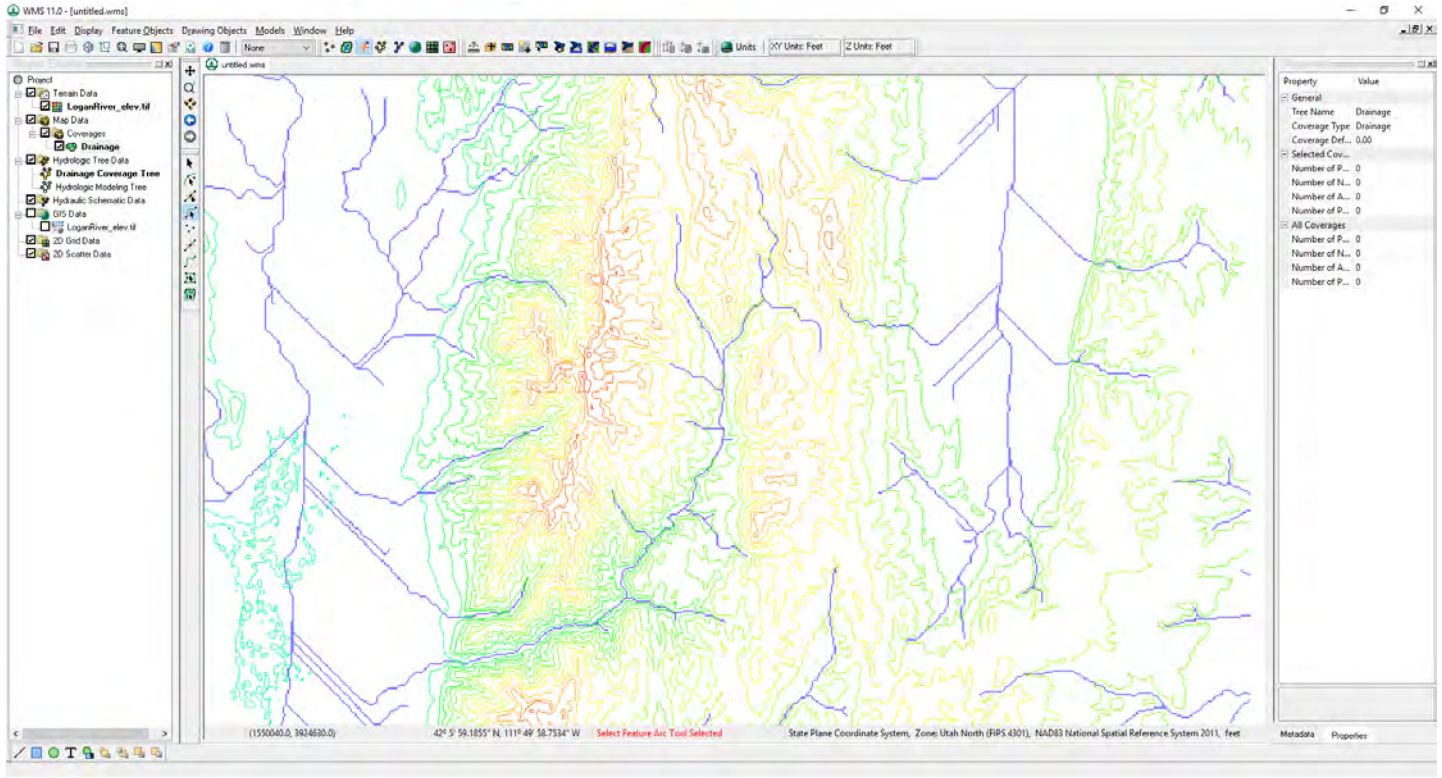
1. Read Elevations



2. Compute Flow Data – Flow Directions and Accumulations (TOPAZ or TauDEM)

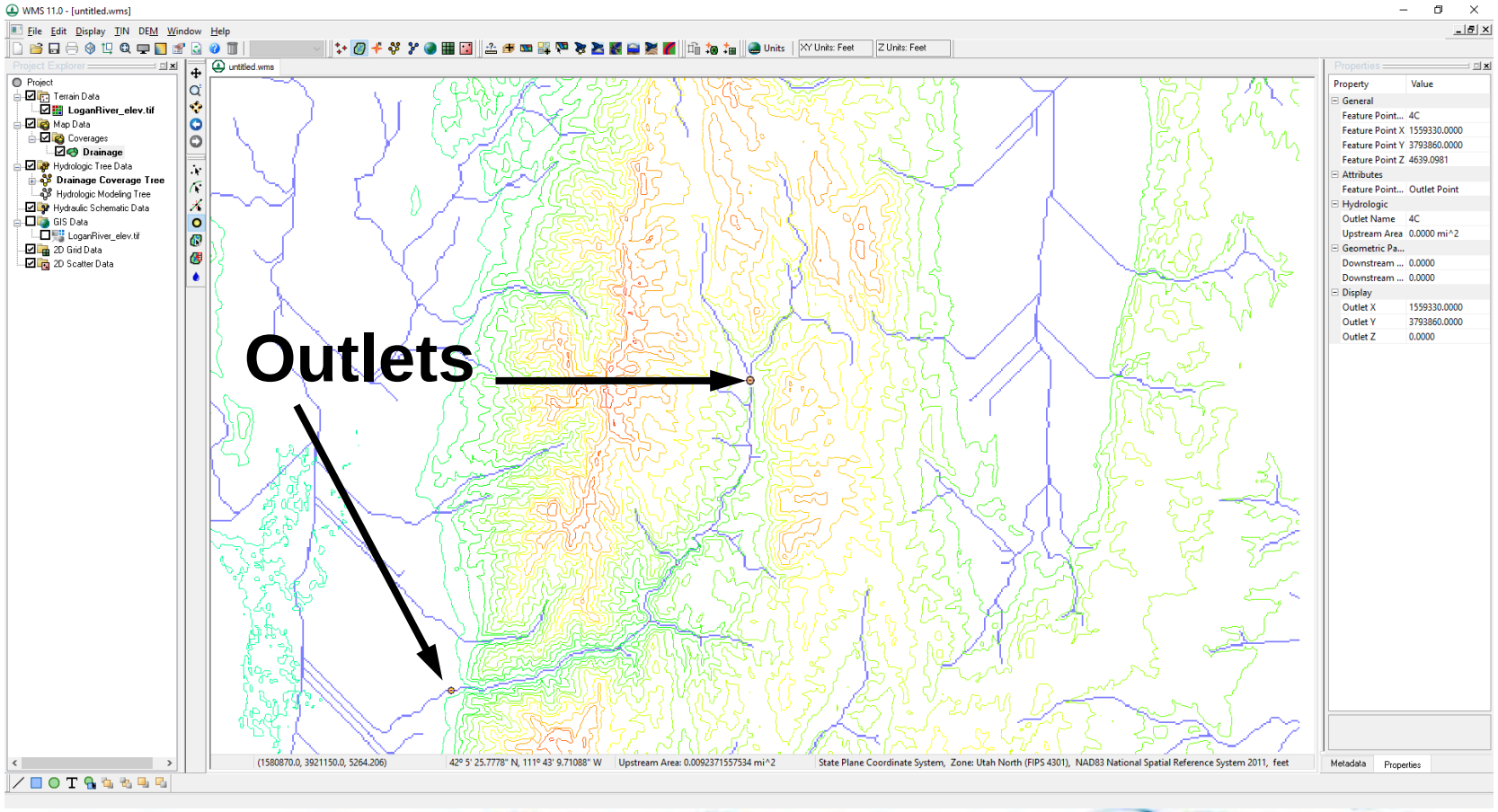


2. Compute Flow Data – Accumulation Threshold

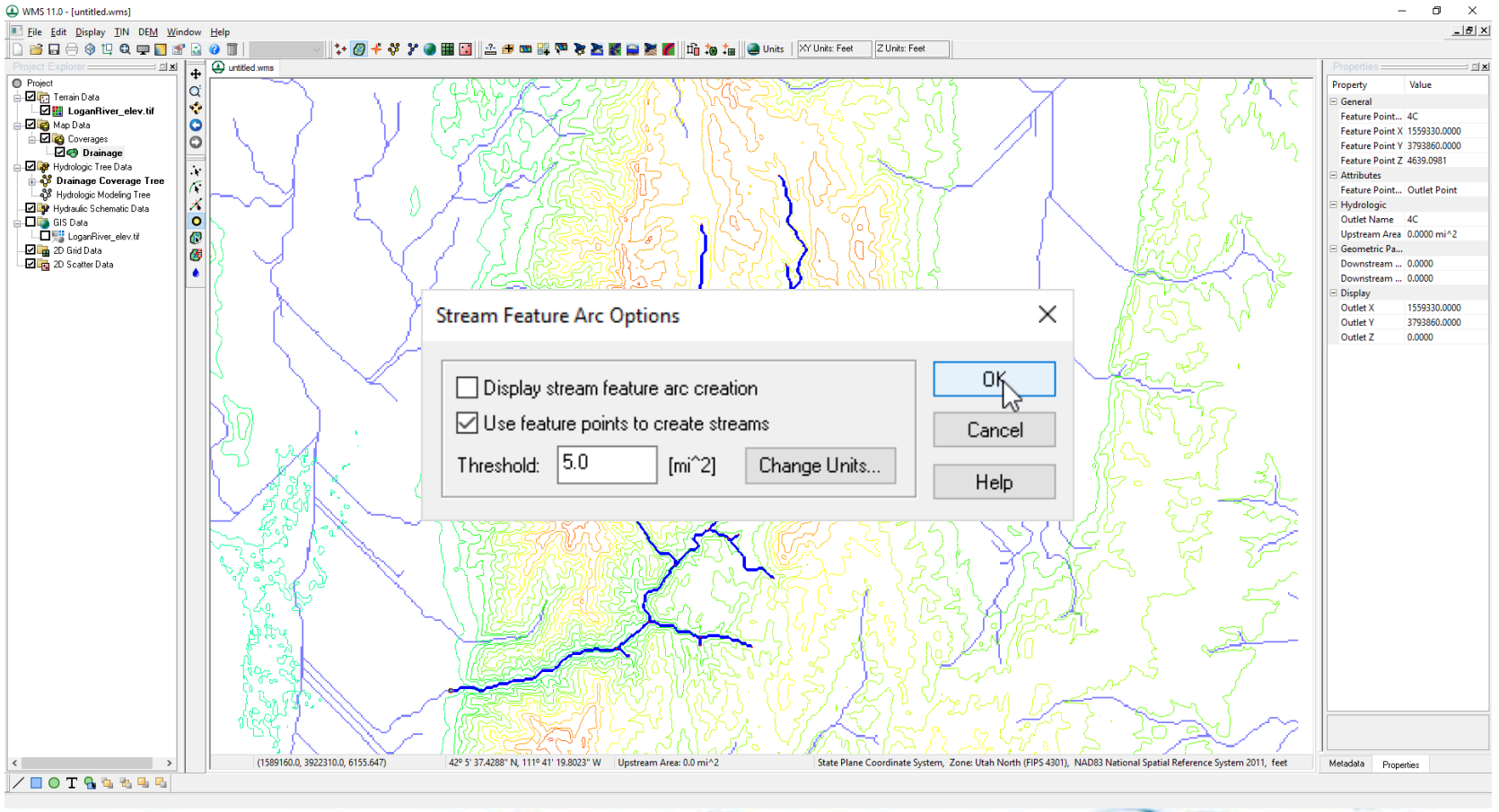


1.0 2.0 5.0

3. Define Basin Outlet(s)



4. Convert DEM Streams to Feature Objects



Which two delineation functions are performed by TOPAZ?

A) Flow direction computation and basin delineation

B) Basin delineation and computing geometric parameters

C) Flow direction computation and computing geometric parameters

D) Flow direction and flow accumulation computation

Which two delineation functions are performed by TOPAZ?

- The correct answer is:

A) Flow direction computation and basin delineation

B) Basin delineation and computing geometric parameters

C) Flow direction computation and computing geometric parameters

D) Flow direction and flow accumulation computation

If we have a larger value for the flow accumulation threshold, we would expect …

A) The streams created from the DEM accumulation cells to be relatively shorter

B) The streams created from the DEM accumulation cells to be relatively longer

C) The streams created from the DEM accumulation cells are not affected by the flow accumulation threshold

If we have a larger value for the flow accumulation threshold, we would expect …

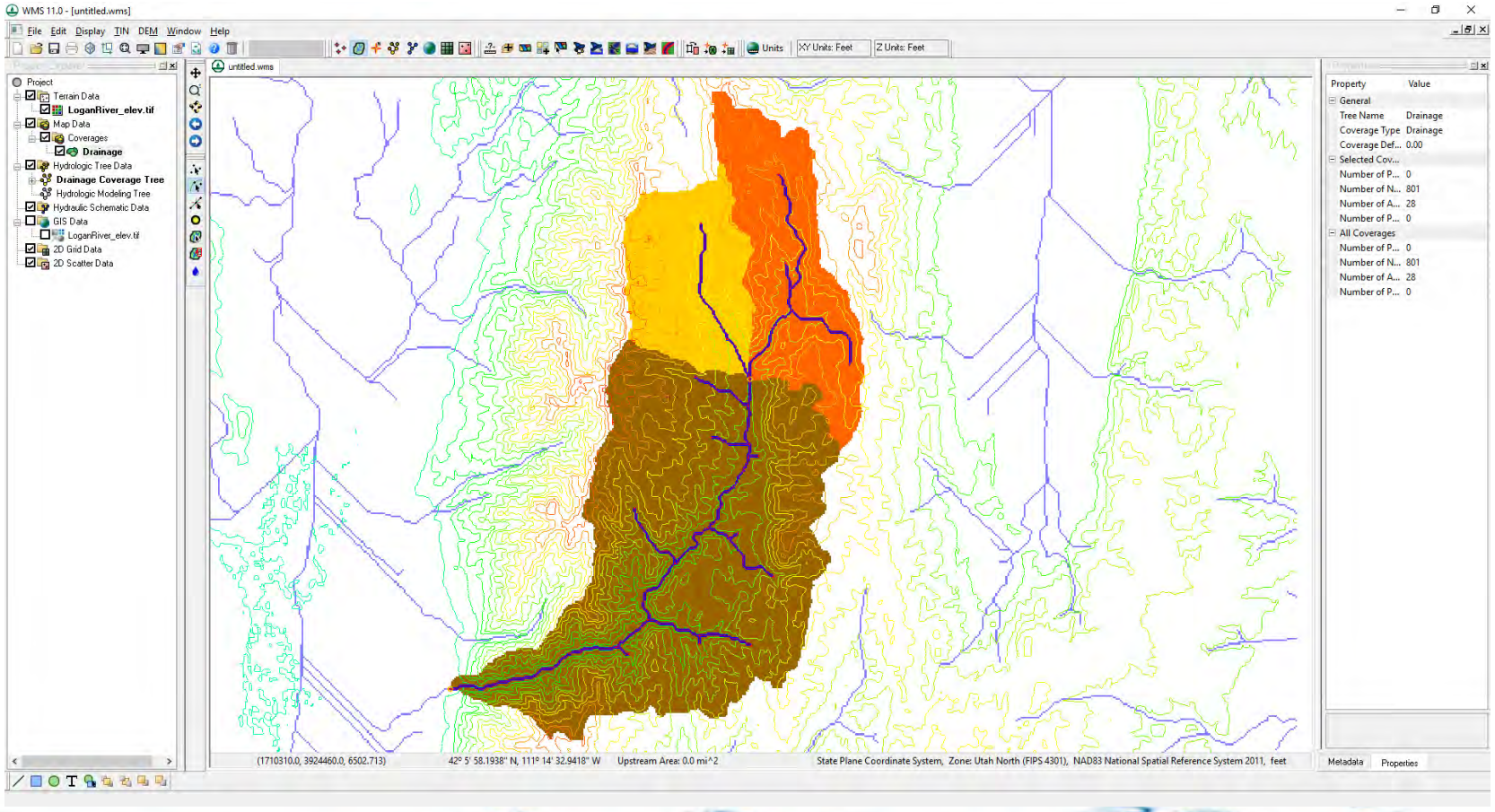
- The correct answer is:

A) The streams created from the DEM accumulation cells to be relatively shorter

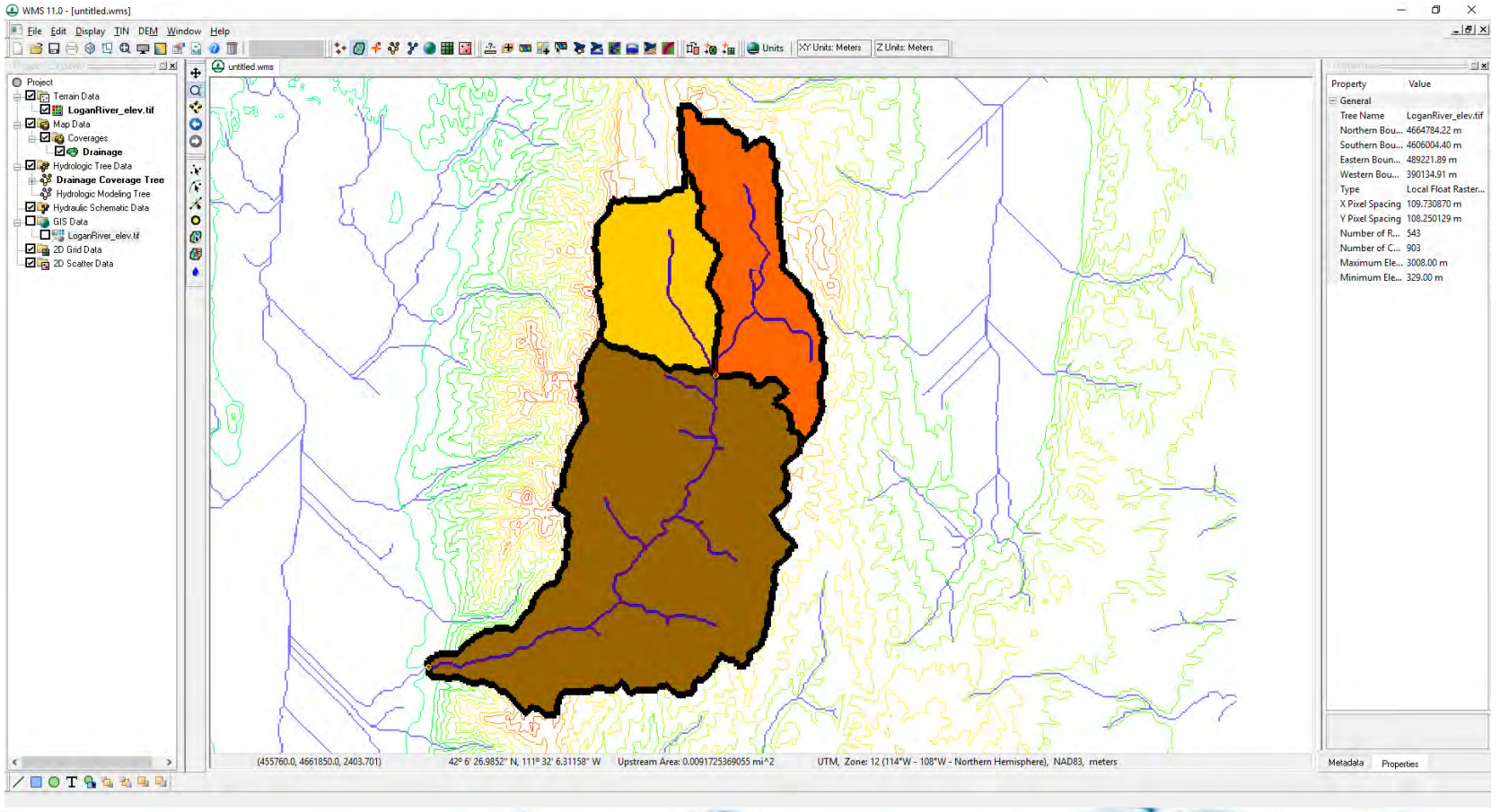
B) The streams created from the DEM accumulation cells to be relatively longer

C) The streams created from the DEM accumulation cells are not affected by the flow accumulation threshold

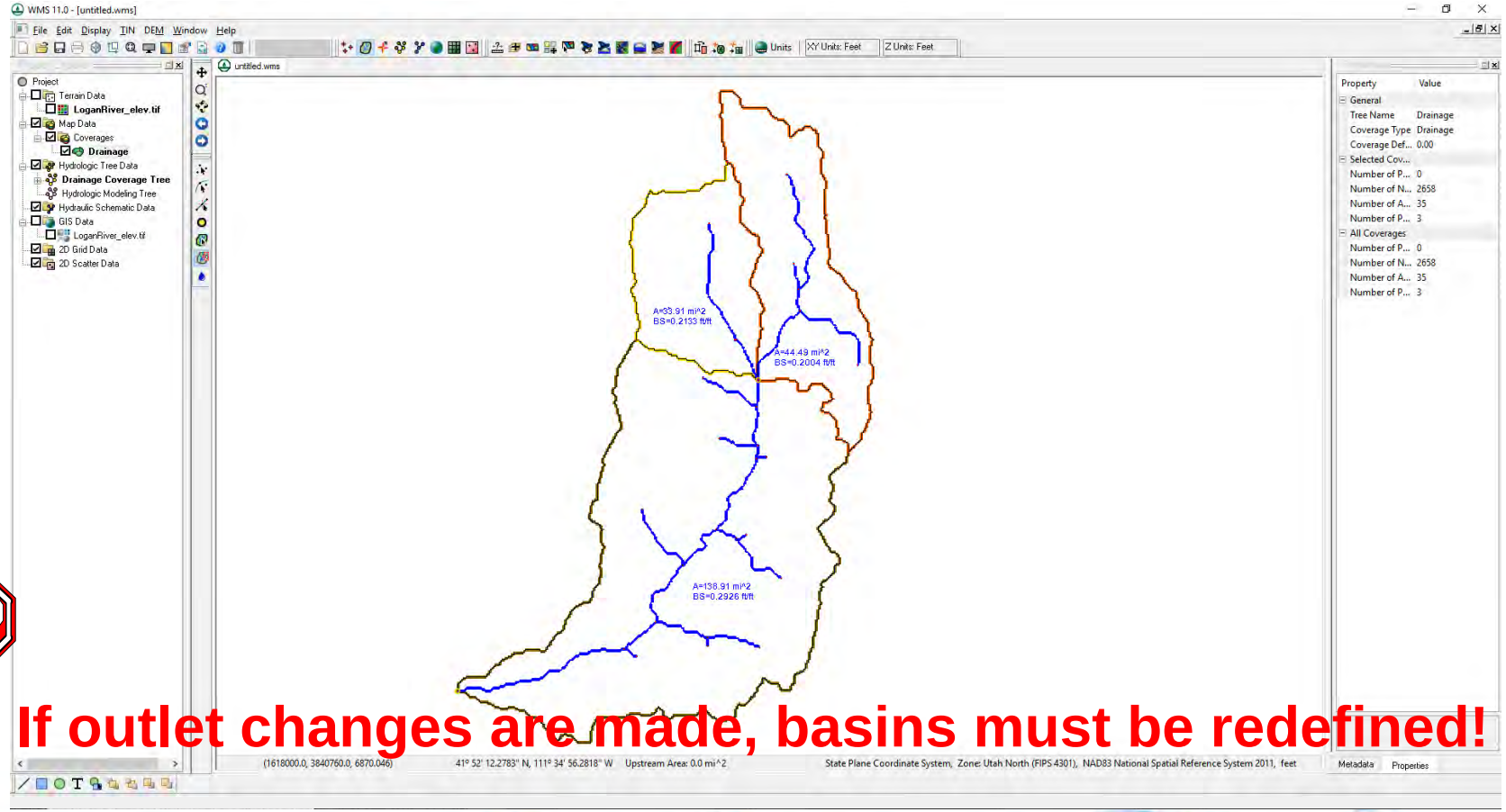
5. Define Basin(s)



6. Convert Boundaries to Polygons

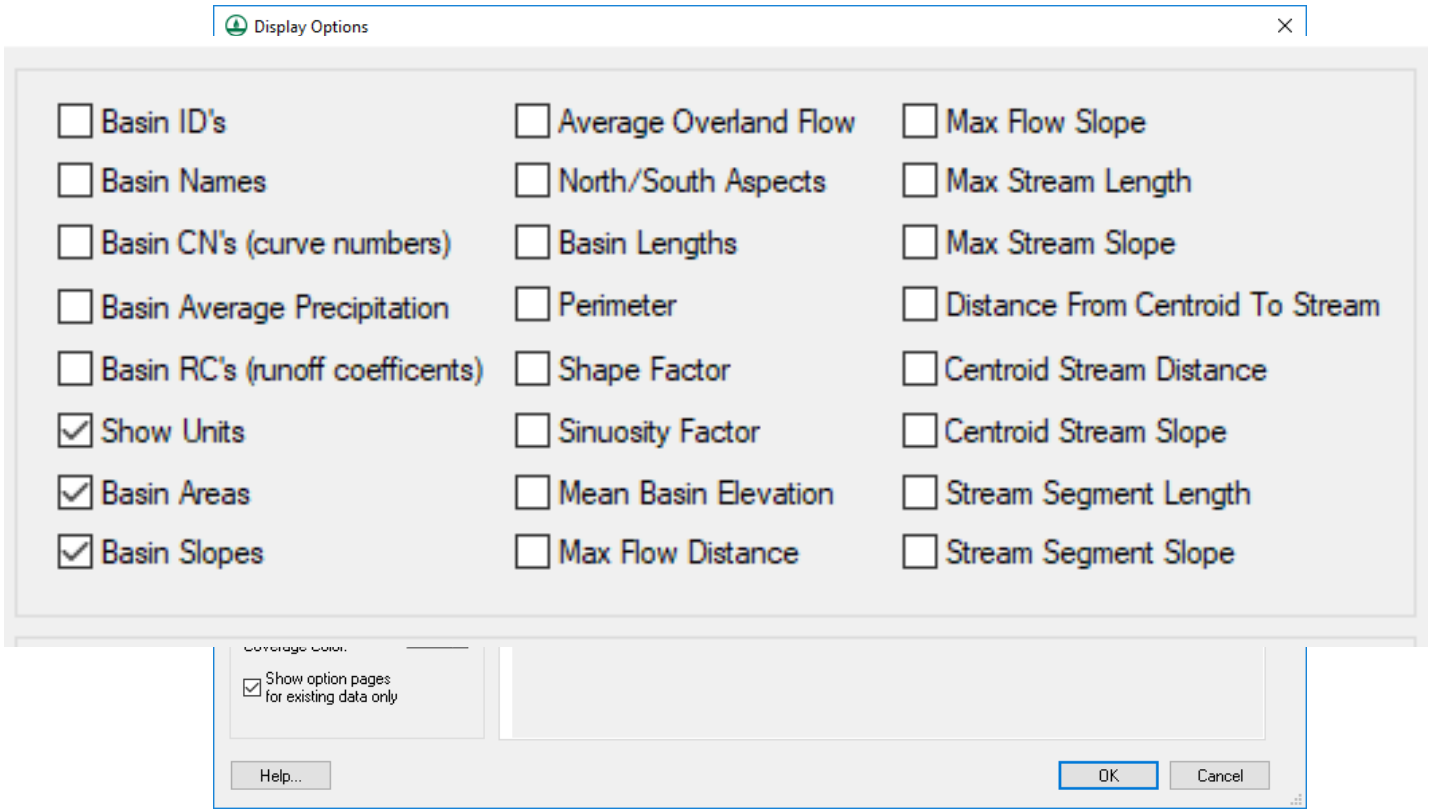


7. Compute Basin Parameters

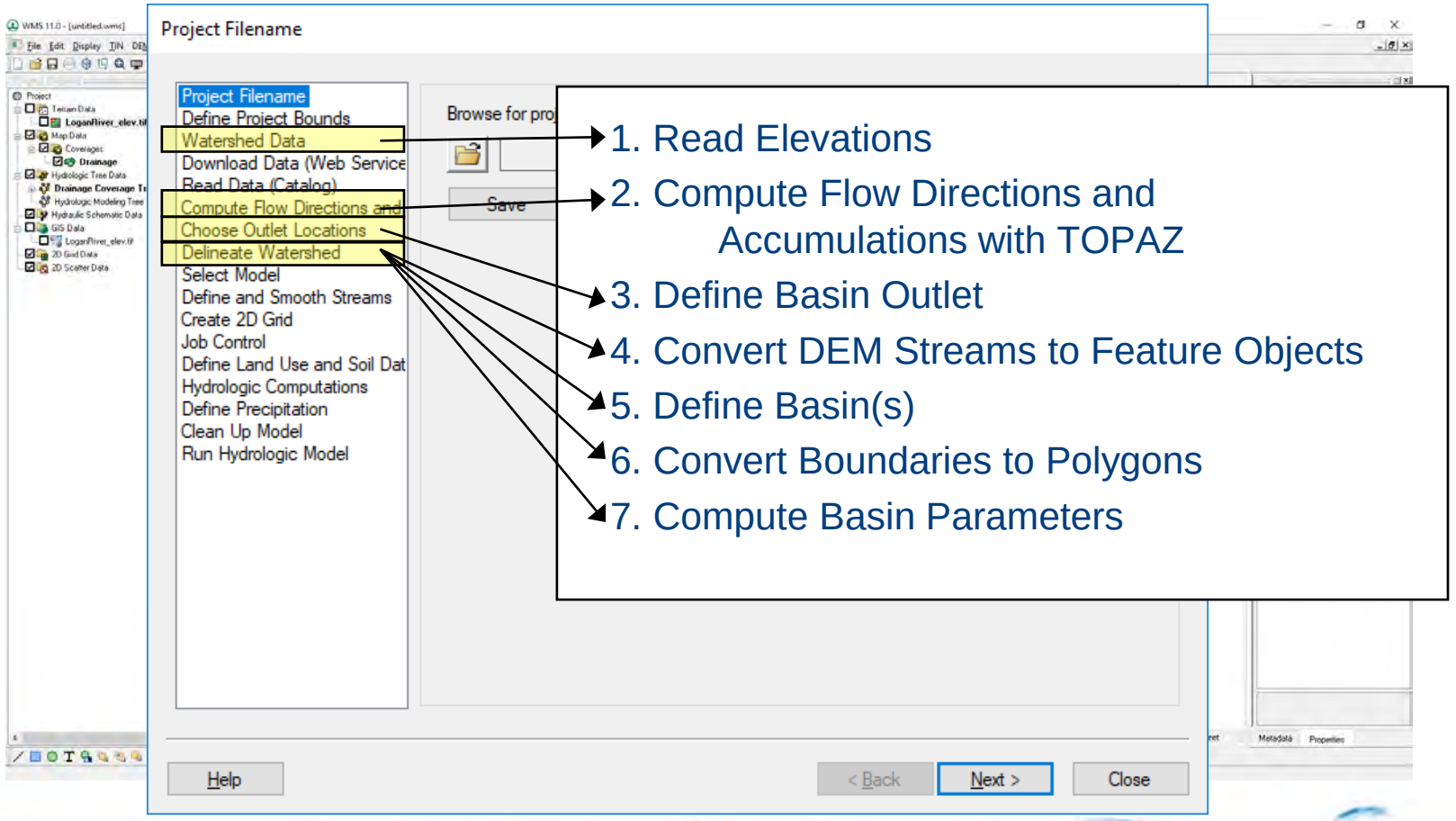


If outlet changes are made, basins must be redefined!

7. Geometric Computations



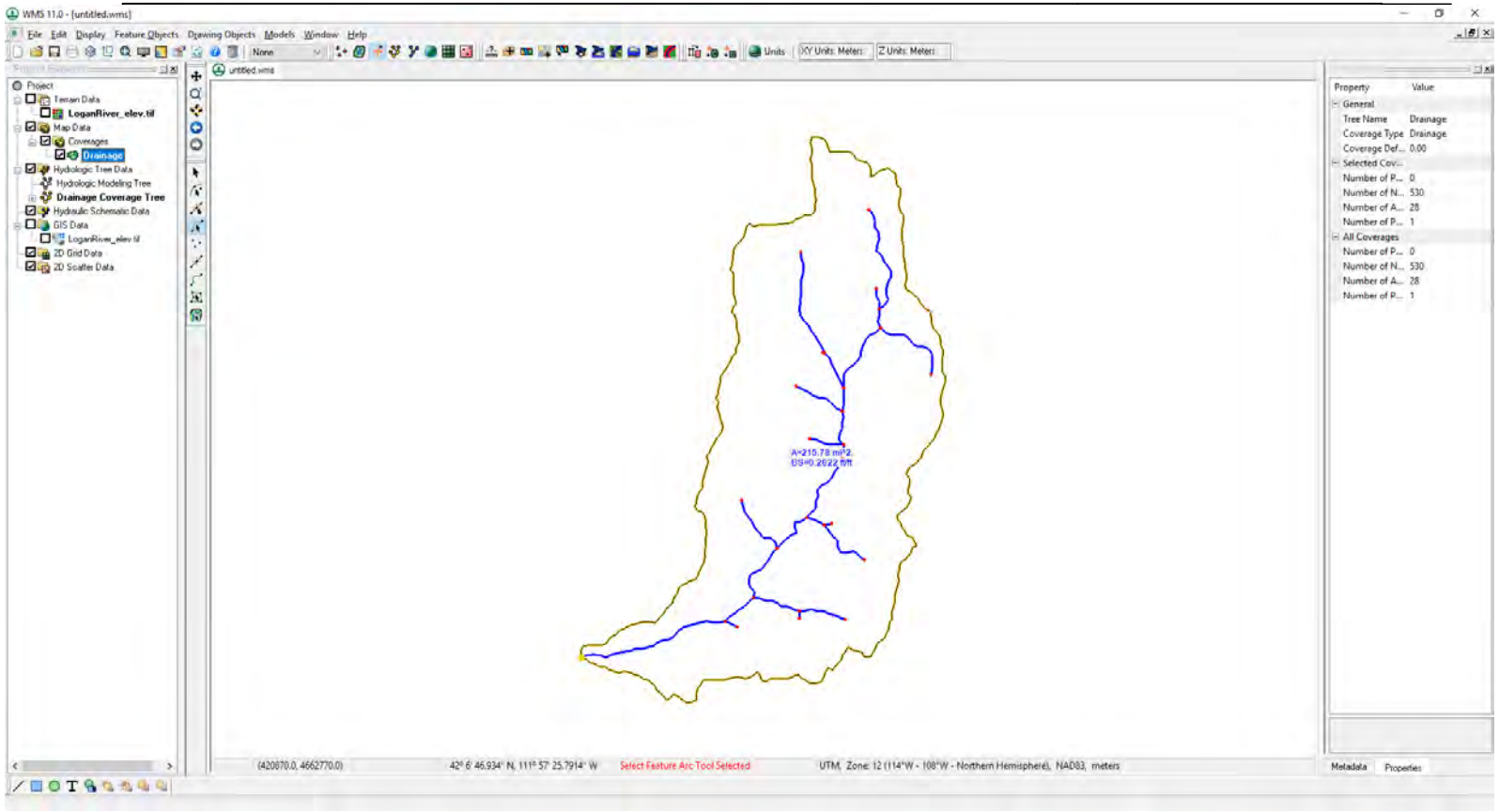
Hydrologic Modeling Wizard



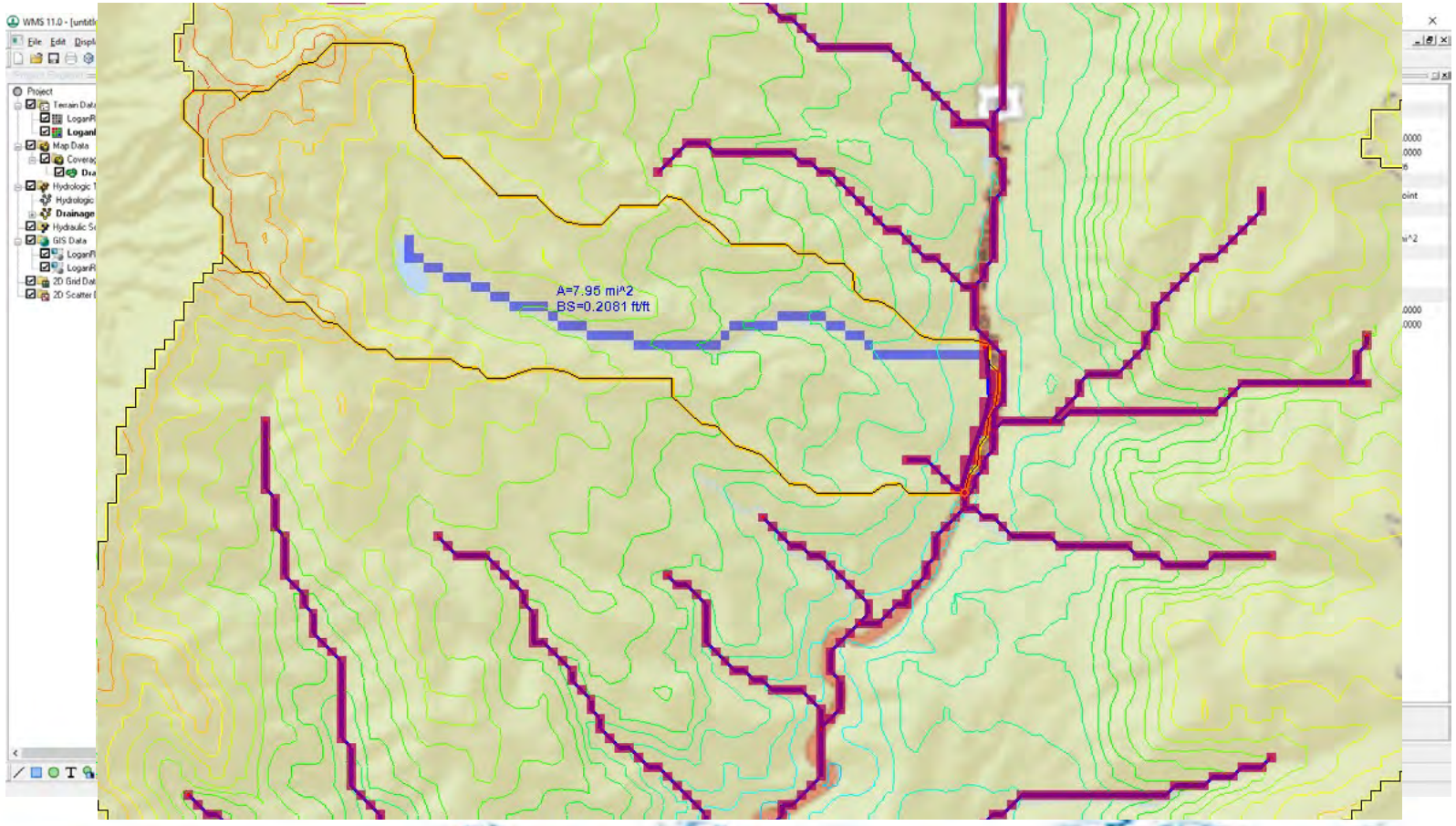
Additional DEM Delineation Topics

- Smoothing streams and boundaries
- Representing roads, railroads, canals, etc.

Smoothing Streams and Boundaries



Representing roads, railroads, canals, etc.



Features such as roads, canals, ditches, and embankments may be represented by:

A) Selecting a node or vertex and converting it to a stream

B) Digitizing a stream arc from upstream to downstream

C) Digitizing a stream arc from downstream to upstream

D) None of the above

Features such as roads, canals, ditches, and embankments may be represented by:

- The correct answer is:

A) Selecting a node or vertex and converting it to a stream

B) Digitizing a stream arc from upstream to downstream

C) Digitizing a stream arc from downstream to upstream

D) None of the above

Demonstration

Review & Discuss

- We are now able to:
  - Use DEMs for basin delineation.
  - Use WMS to compute geometric basin data from a delineated basin.

Workshop

- Let's practice …
- **Exercises** folder for instructions
- **DemDelin** folder contains the data files required for the exercise.