

Haley Morris  
DTA 493  
Abstract  
12/2/18

### Watershed Delineation Comparison of the Lower Willamette River

The aim of this study was to compare a manual delineation using tools from the Hydrology toolset and the stream burning method to determine which one computed a higher resolution and more accurate results. The focus area in this study was Johnson Creek which pours into the Lower Willamette River. Johnson Creek is known for intense seasonal flooding after channelizing the creek in 1933. The methods that were used for the unenhanced delineation include using the Hydrology tools in the Spatial Analyst toolbox such as sinks, fill, flow direction, flow accumulation, Con, stream link, and watershed. The stream burn method required the same tools as the unenhanced method but the con tool was used first to burn the pipes into 1 meter DEM. The threshold value that was used for both methods was 1200000 to eliminate the number of channel heads. An issue that was encountered was having a large amount of channels that were not in my study area but was solved by using the raster to polyline tool, using the editor toolbar to delete unnecessary channels, and then converting it back to a raster while ensuring that the correct inputs were used. The stream burning method resulted in a more accurate watershed delineation. This is because pipes and sewage lines need to be considered when delineating an urban watershed. Future research could include other enhanced methods such as AGREE, to determine if that is a more accurate method than stream burning for an urban area. In addition, comparing a channelized river to a non-channelized river in an urban area would also be useful for future research.

# **A comparison of Watershed Delineation Methods for Johnson Creek**

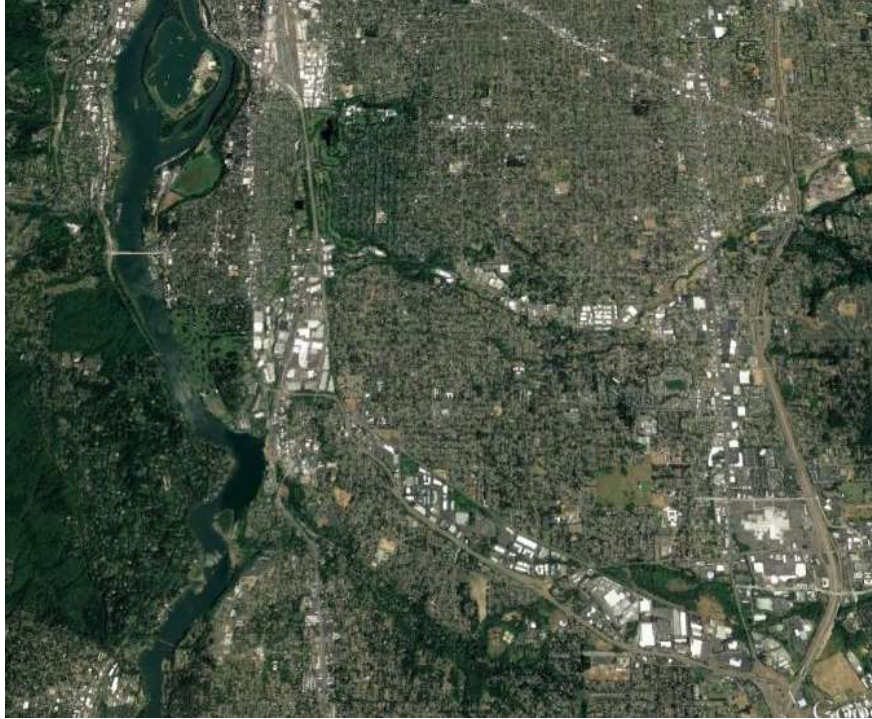
**By: Haley Morris**

# Johnson Creek History

- Seasonal flooding causes danger for residents nearby
- Channelized the creek in 1933, exacerbated flooding in sections of the creek



# Study Area

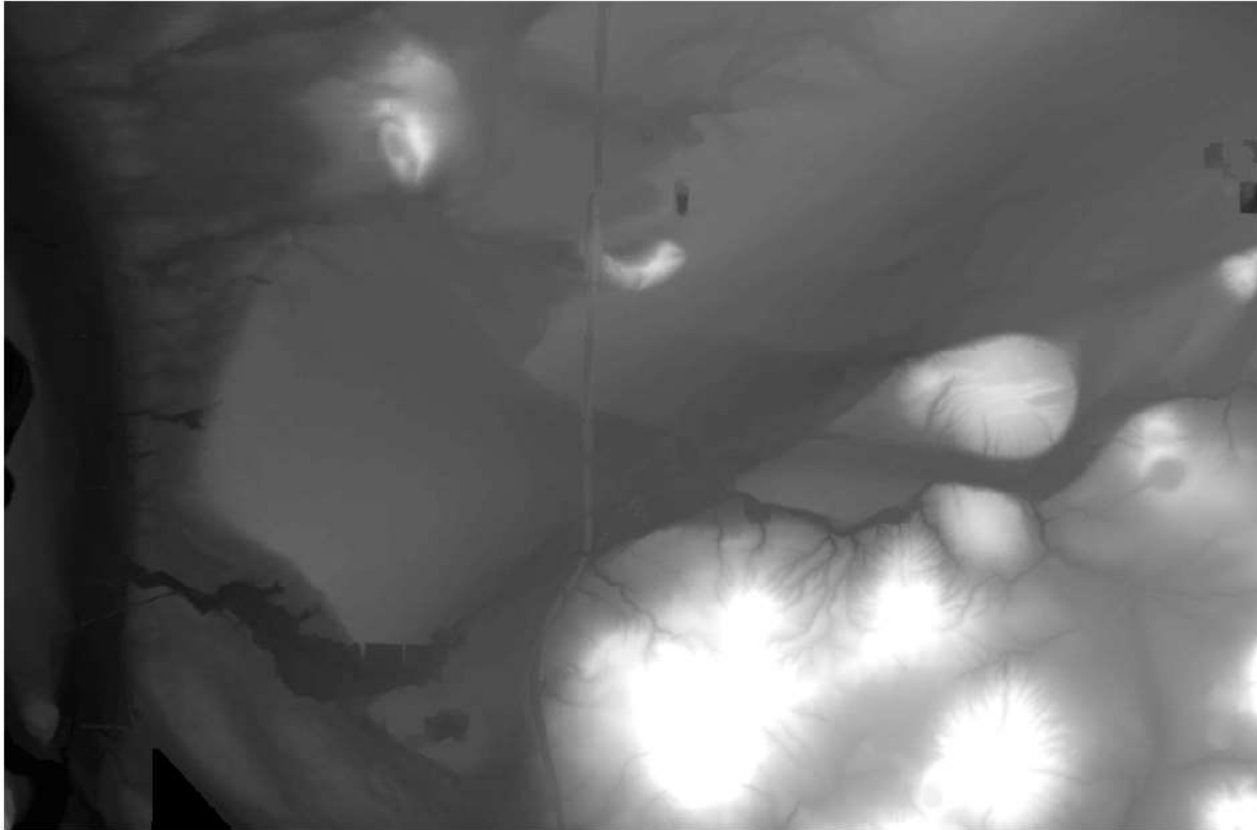


Willamette River



Johnson Creek

# Clipped DEM



Watershed Delineation  
Methods:

Unenhanced Method  
(hydrology tools)

Stream Burning

# Unenhanced Methods

## Tools:

Flow direction

Sinks

Filled sinks

Flow Accumulation

Stream Link

Watershed

## Data:

USGS 1 meter DEM

Threshold of 1200000

HUC (Hydrologic Unit Code) 6

# Stream Burning Methods

Burned stream at a uniform depth of 10 ft into the DEM

Data: DEM and USGS Collection Lines and Pipes Vector Data

Tools:

- Same as un-enhanced method
- Conditional Statement to create burned raster
- Raster to Polyline tool and Polyline to Raster tool
- Used a threshold of 1200000

Stream Burn: Con(notpipe == 0, demclip - 10, demclip)



# Methods Cont'd



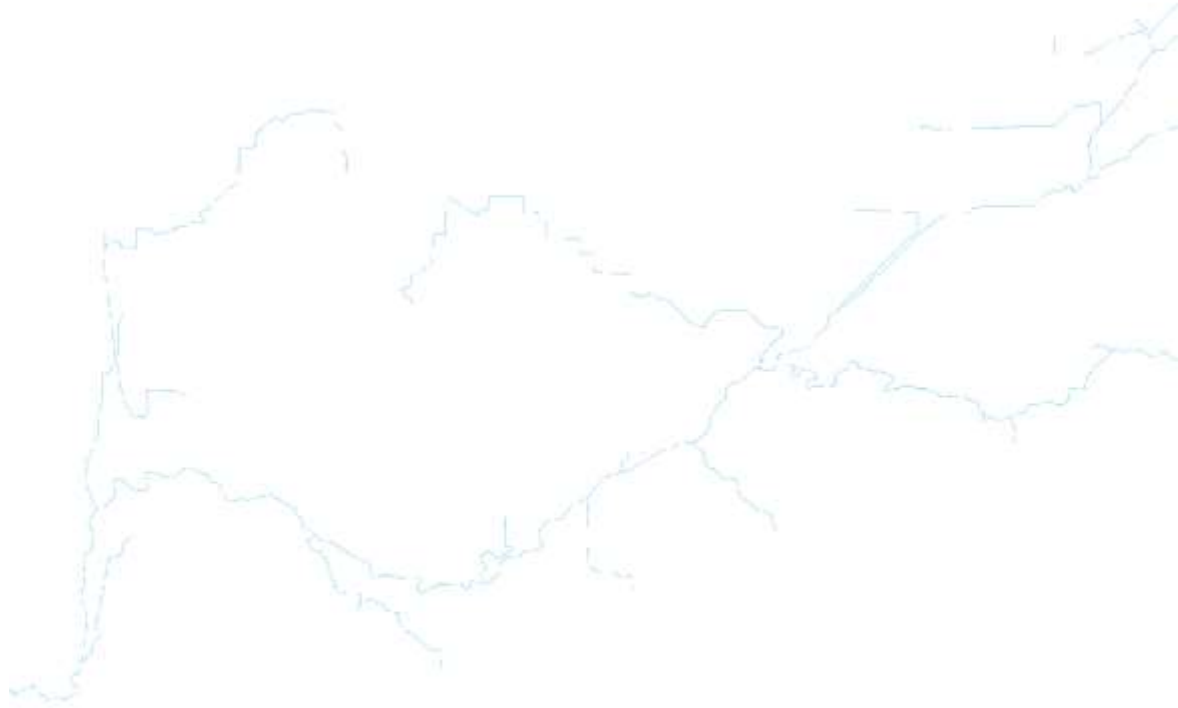
Pipes and Not Pipes



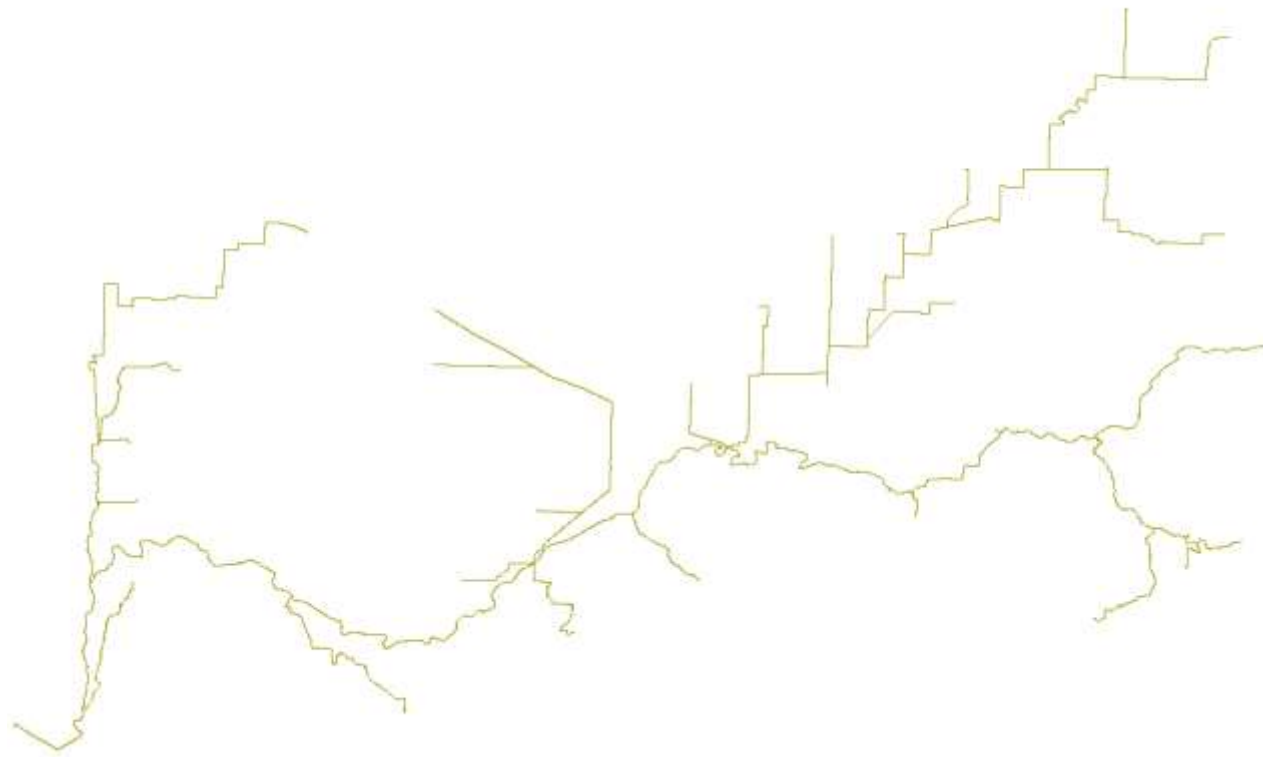
Burned Streams



# Unenhanced Stream Link



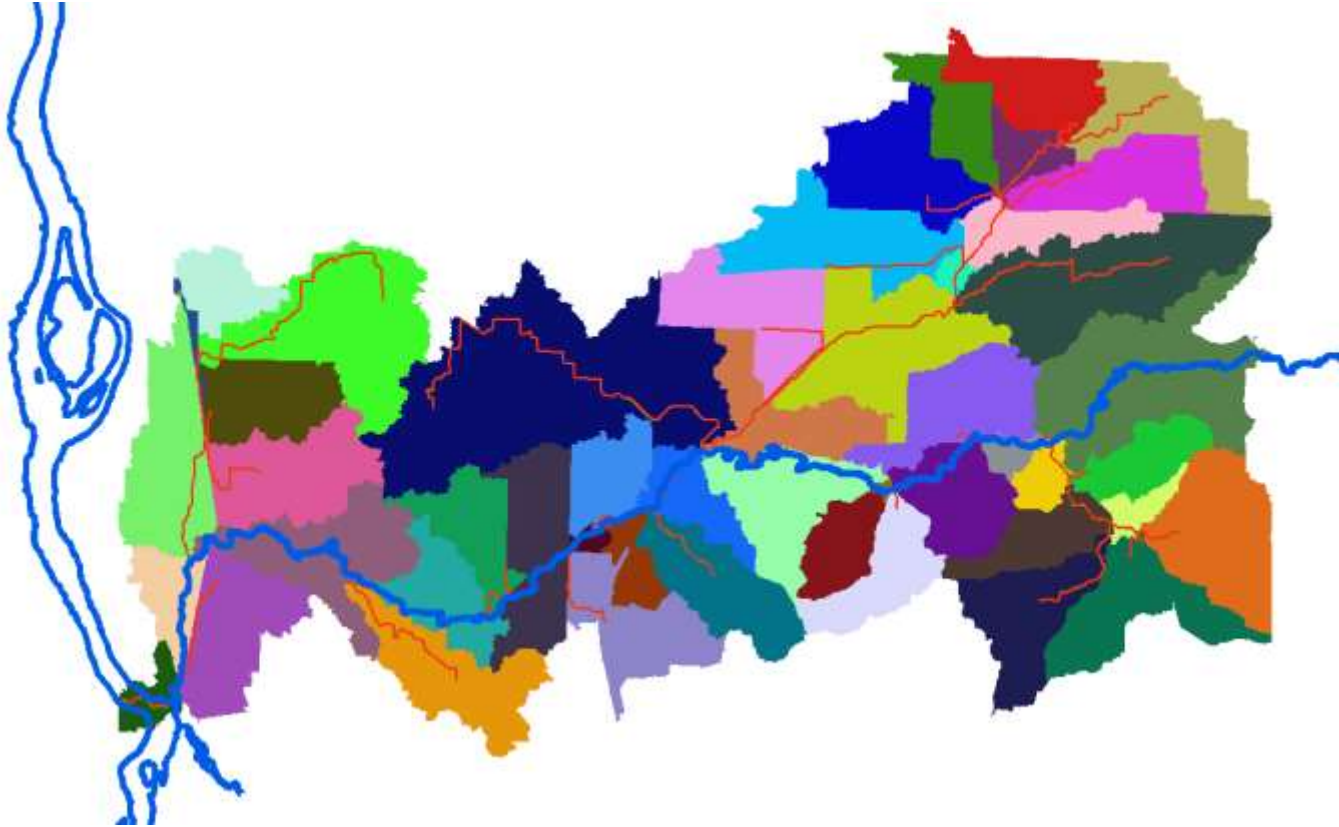
# Burn Stream Link



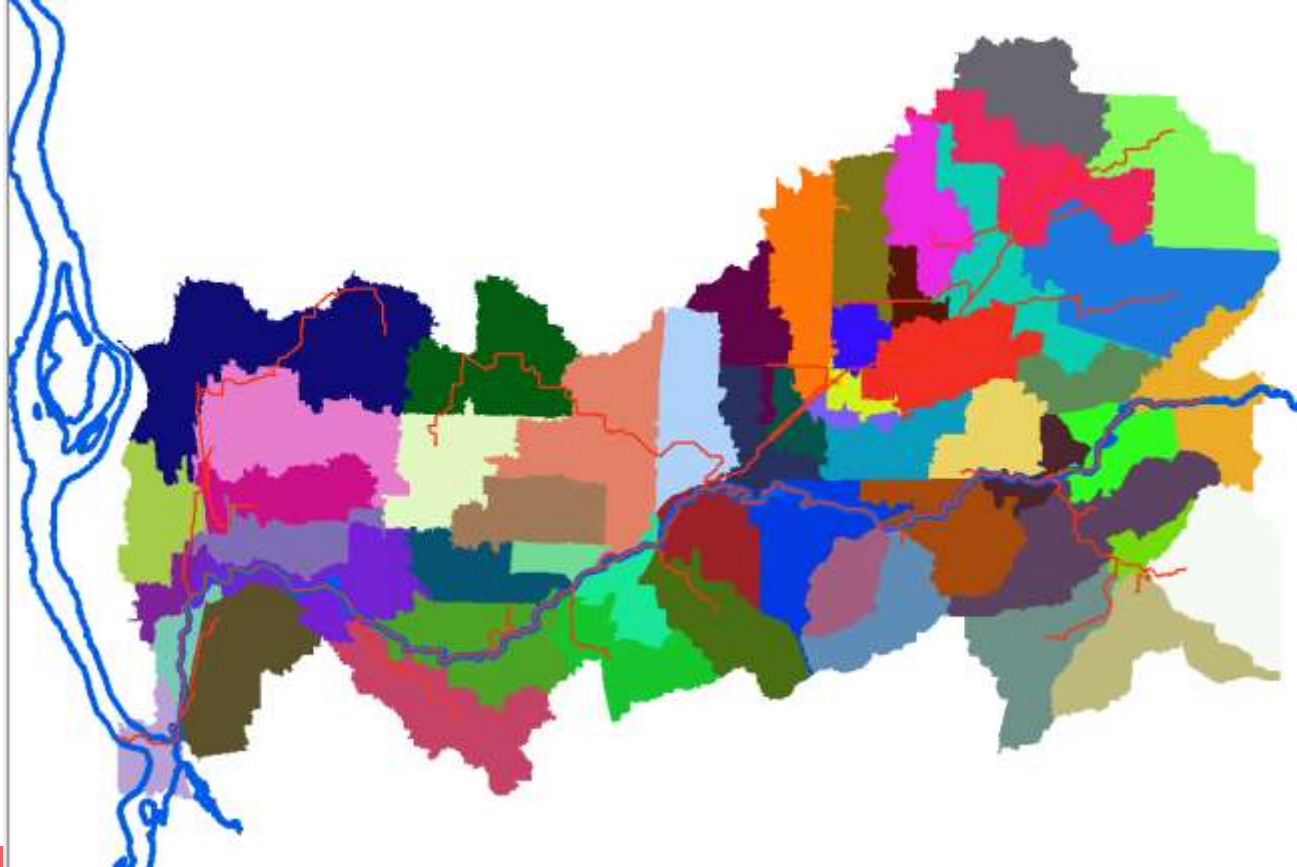
# Lower Threshold



# Unenhanced Method Results



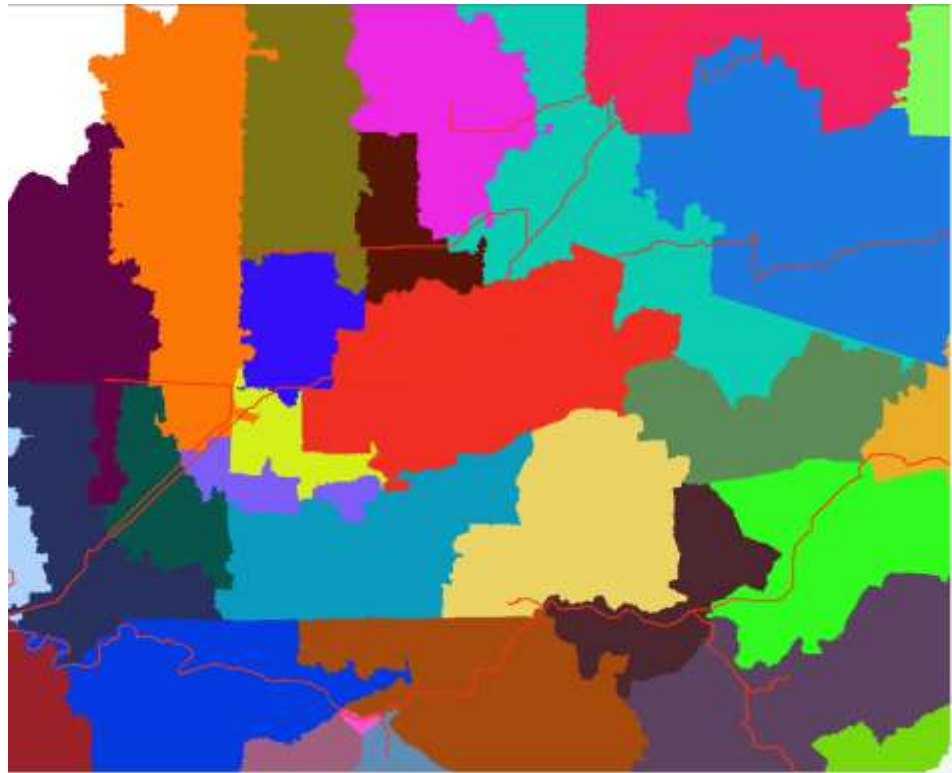
# Stream Burn Results



# Watershed Delineation Comparison



Unenhanced



Burn



# Results

Stream Burning is more accurate

115 watershed for un-enhanced and 113 watersheds for stream burn

Flow accumulation tool takes SO LONG

Future Research:

- Using another enhanced method like AGREE