# Automated Watershed Delineator: User Guide

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AWD is a script that uses the 'arcpy' library of Python to automatically delineate watersheds from a DEM raster file.

Start by running the Python script, 'ws_delim.py':


When run, the program will ask the user for the path to their DEM raster file to delineate watershed boundaries from:

```
========== RESTART: C:\PythonPro\SP_FinalProject\ws_delin.py ==========
File path to DEM raster:
```

If you input a path that does not exist, or is not a raster, you will be asked to put in the file path again:

```
========== RESTART: C:\PythonPro\SP_FinalProject\ws_delin.py ==========
File path to DEM raster: not_a_path
File path does not exist. Please try again.
File path to DEM raster: C:\PythonPro\SP_FinalProject\ws_delin.py
This file is not a valid raster dataset. Please input a valid raster.
File path to DEM raster:
```

Once a valid path to a DEM is input, the program then asks for the output directory:

```
File path to DEM raster: C:\PythonPro\SP_FinalProject\N40W082.hgt
Directory path to send output(s):
```

If you input a path that does not exist, or it is not a directory, you will be asked to put in the file path again:

```
Directory path to send output(s): not_a_path_again
Directory path does not exist. Please try again.
Directory path to send output(s): C:\PythonPro\SP_FinalProject\N40W082.hgt
This is not a directory. Please input a valid directory path.
Directory path to send output(s):
```

Once a valid path to an output directory is input, the program will ask what outputs you want:

```
Directory path to send output(s): C:\PythonPro\SP_FinalProject\SP_FinalProject.gdb
Do you want watershed (p)olygons, (r)aster, or (b)oth?
```

If you do not enter either ‘p’, ‘r’, or ‘b’, the program will ask you to try again:

```
Do you want watershed (p)olygons, (r)aster, or (b)oth? n
Invalid choice. Please input 'p', 'r', or 'b'.
Do you want watershed (p)olygons, (r)aster, or (b)oth? none
Invalid choice. Please input 'p', 'r', or 'b'.
Do you want watershed (p)olygons, (r)aster, or (b)oth?
```

Once a valid output choice has been chosen, the program then asks you to input your desired flow accumulation threshold:

```
Do you want watershed (p)olygons, (r)aster, or (b)oth? b
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds):
```

This way, the user can choose and fine-tune the size of the watersheds that get output. A smaller number, such as 500, will produce more, smaller watersheds. A larger number, such as 100,000, will produce less, larger watersheds.

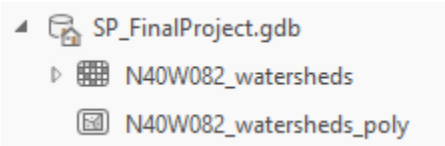
The threshold number you input must be a positive integer:

```
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds): 3.14
Not a valid number. Please enter a positive integer.
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds): -9
Please enter a positive integer.
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds): 0
Please enter a positive integer.
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds):
```

Once you put in a valid threshold, the program will start to produce the watersheds. (This may take some time):

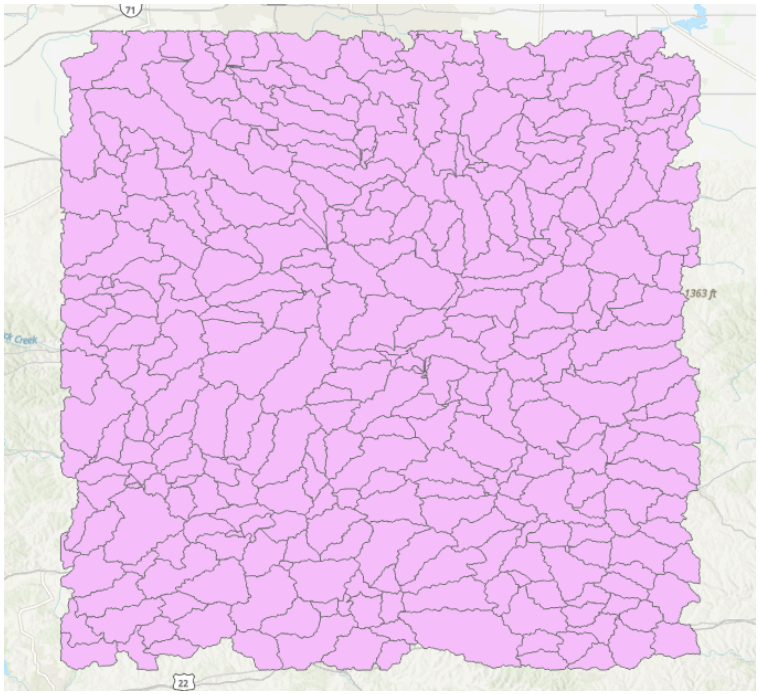
```
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds): 20000

Filling DEM...
Calculating Flow Direction...
Calculating Flow Accumulation...
```

Once all steps are completed, the desired output(s) will be present in the chosen output directory:

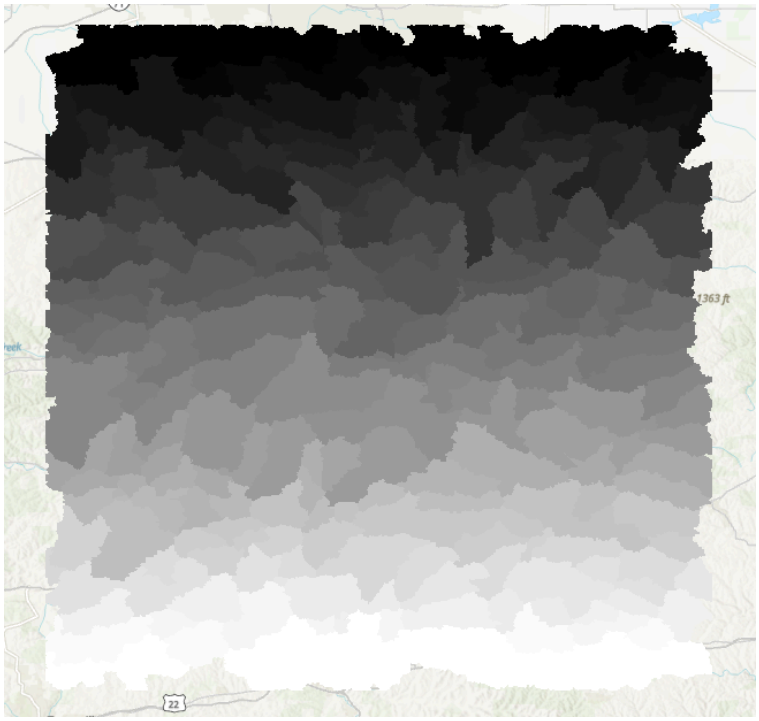



The new files can than be used in any desired GIS context:

Polygons:



Raster:



Full program dialog:

```
>>>
========================== RESTART: C:\PythonPro\SP_FinalProject\ws_delin.py ==========================
File path to DEM raster: C:\PythonPro\SP_FinalProject\N40W082.hgt
Directory path to send output(s): C:\PythonPro\SP_FinalProject\SP_FinalProject.gdb
Do you want watershed (p)olygons, (r)aster, or (b)oth? b
Set flow accumulation threshold (smaller number = more watersheds, larger number = less watersheds): 20000

Filling DEM...
Calculating Flow Direction...
Calculating Flow Accumulation...
Extracting Streams...
Reclassifying Streams...
Assigning IDs to Stream Segments...
Delineating Watersheds...
Saved watershed raster to: C:\PythonPro\SP_FinalProject\SP_FinalProject.gdb\N40W082_watersheds
Converting Watersheds Raster to Polygons...
Saved watershed polygons to: C:\PythonPro\SP_FinalProject\SP_FinalProject.gdb\N40W082_watersheds_poly
>>>
```