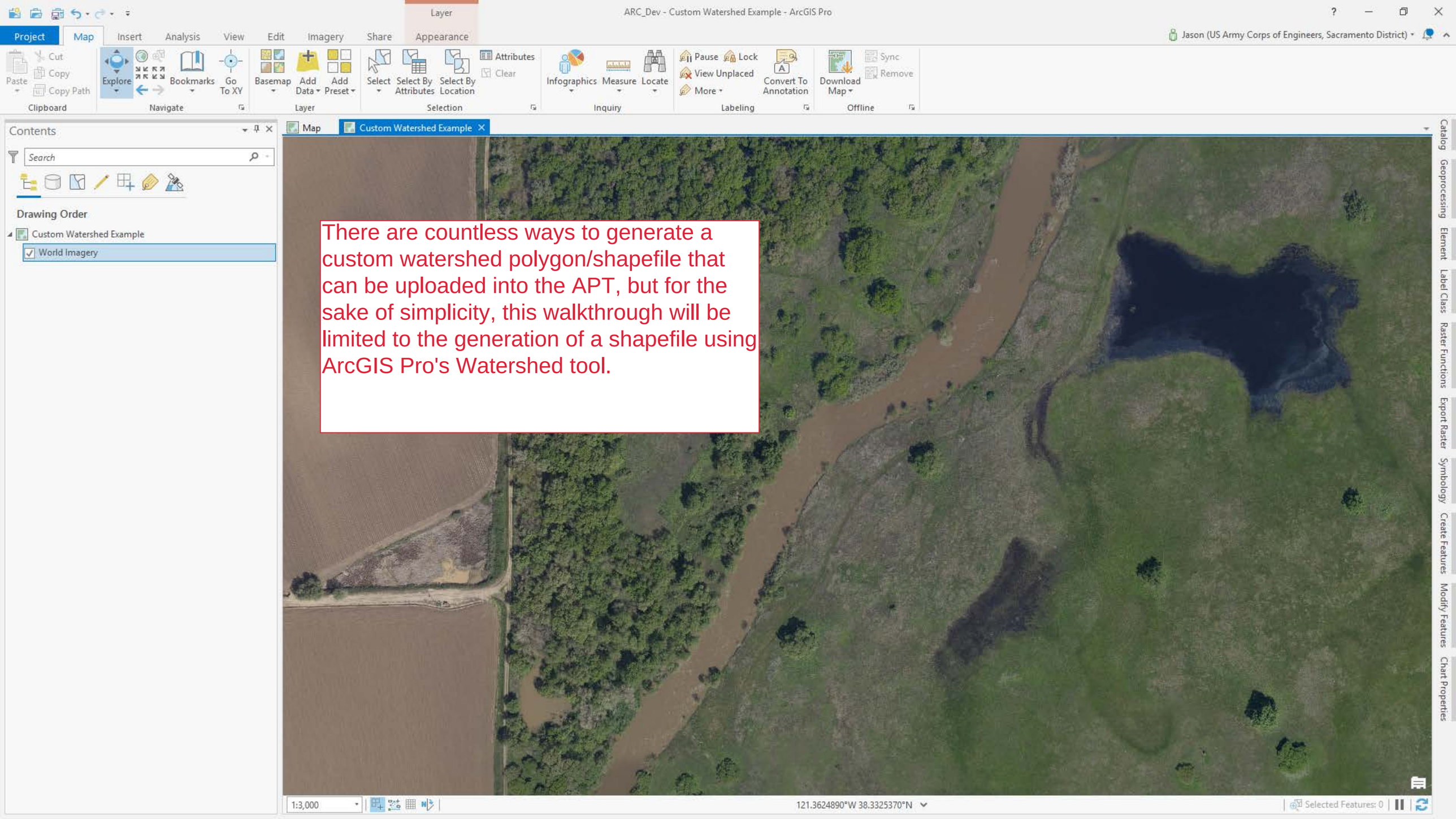
How to Generate a Watershed Analysis using a Custom Watershed Polygon

US Army Corps of Engineers®

Antecedent Precipitation Tool
Version 2.0

Developed by:
U.S. Army Corps of Engineers and
U.S. Army Engineer Research and Development Center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There are countless ways to generate a custom watershed polygon/shapefile that can be uploaded into the APT, but for the sake of simplicity, this walkthrough will be limited to the generation of a shapefile using ArcGIS Pro's Watershed tool.
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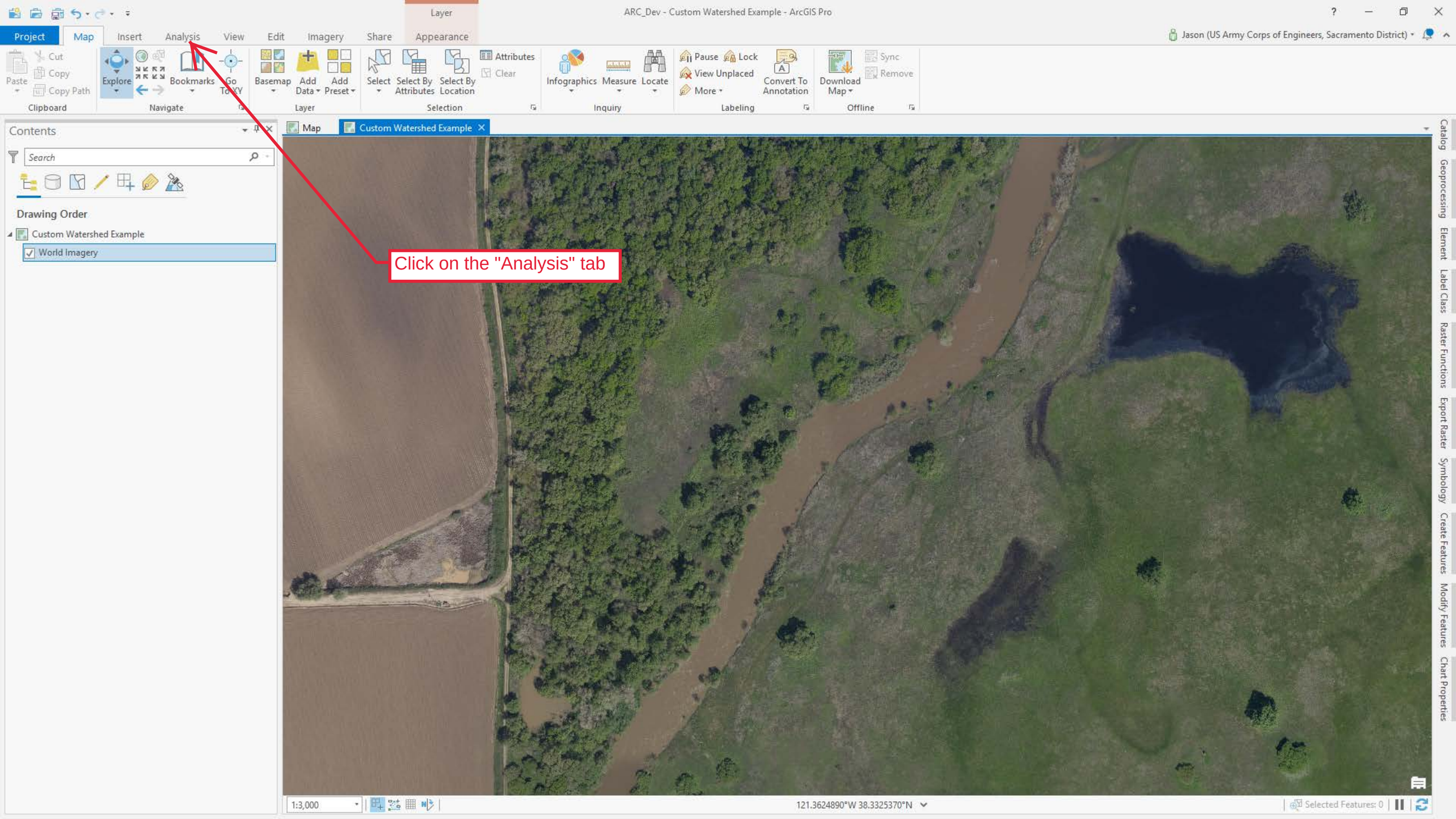
1:3,000
121.3624890°W 38.3325370°N
Selected Features: 0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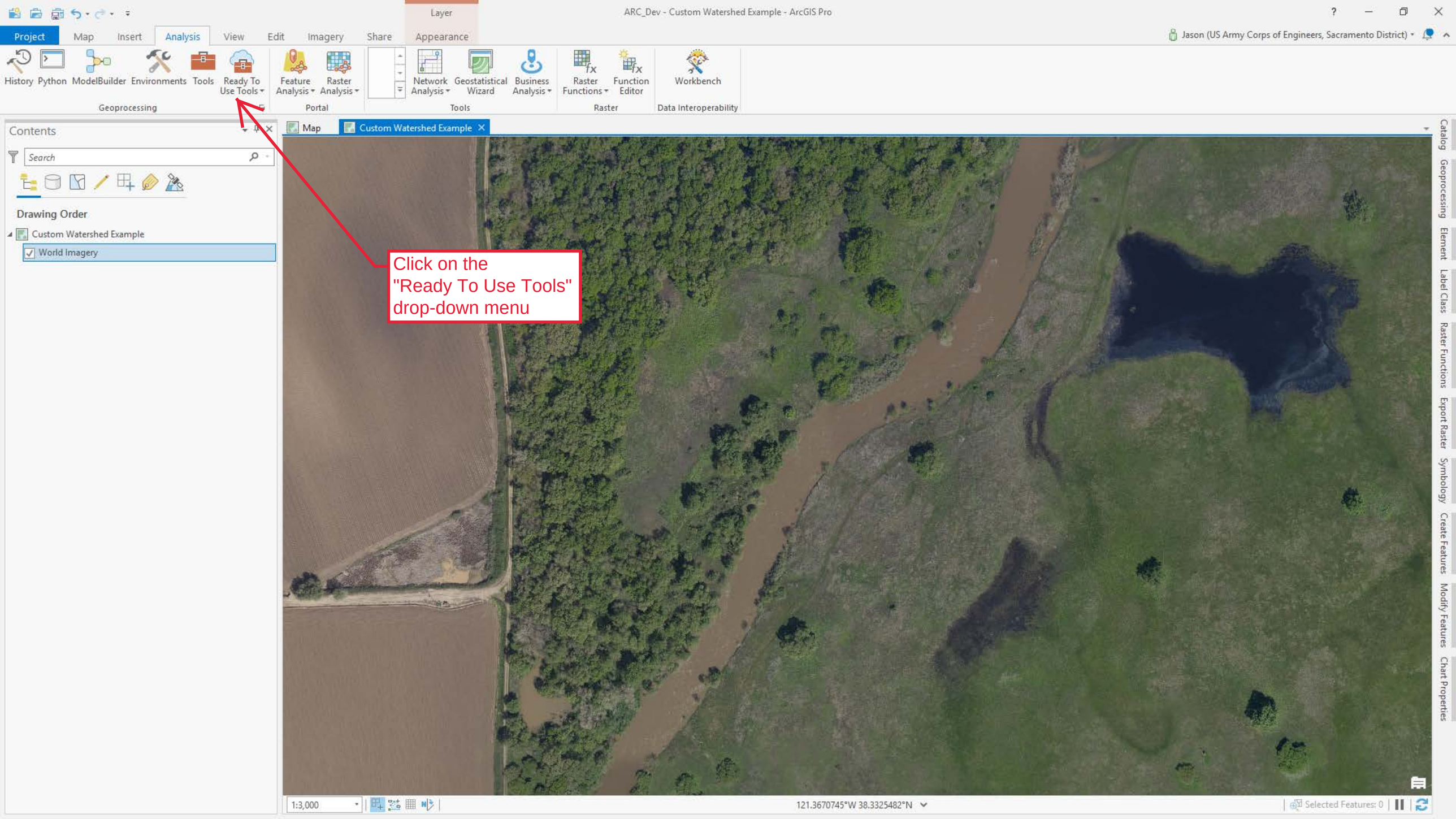
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Click on the "Ready To Use Tools" drop-down menu
1:3,000
121.3670745°W 38.3325482°N
Selected Features: 0
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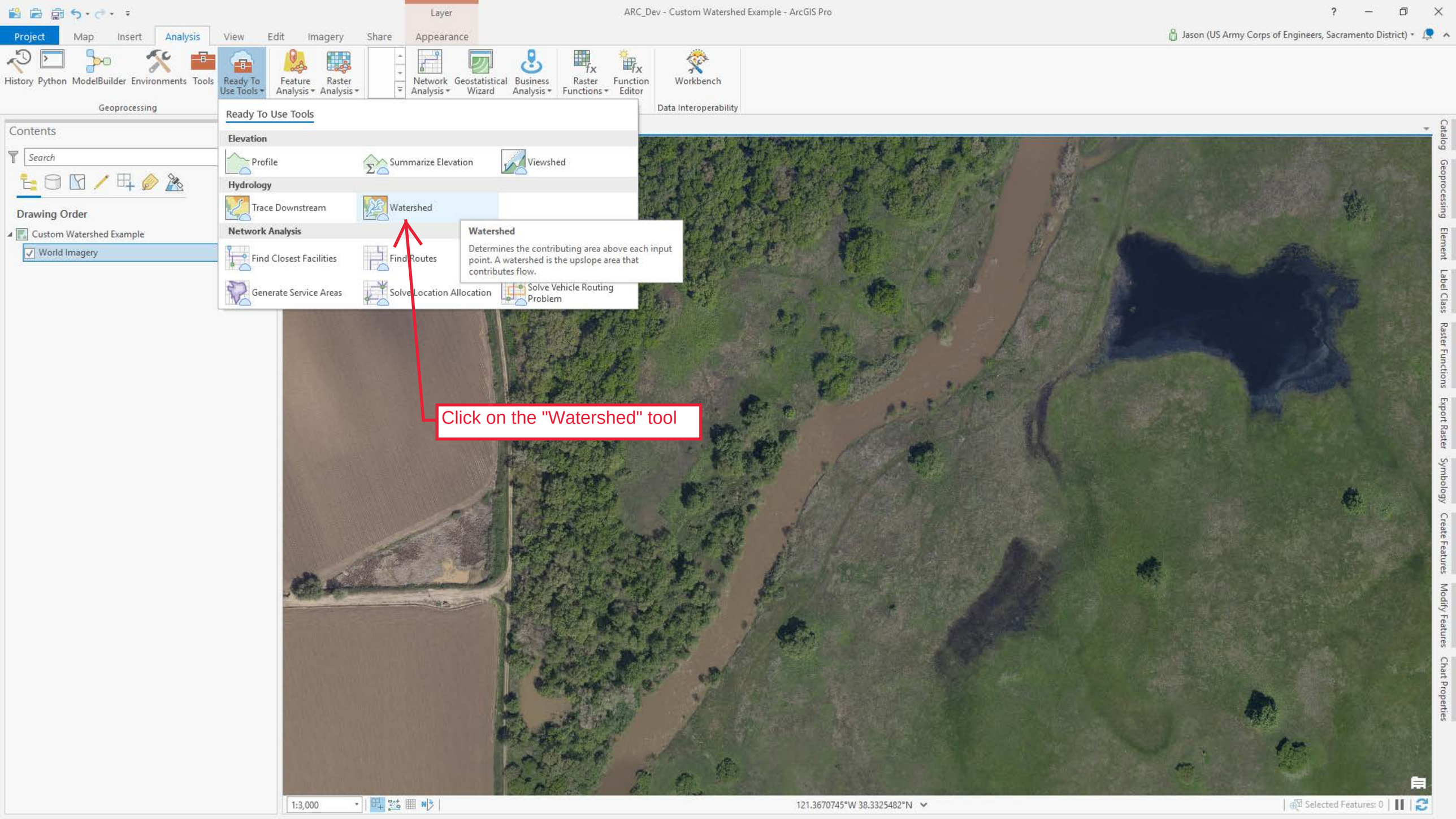
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Determines the contributing area above each input point. A watershed is the upslope area that contributes flow.
Click on the "Watershed" tool
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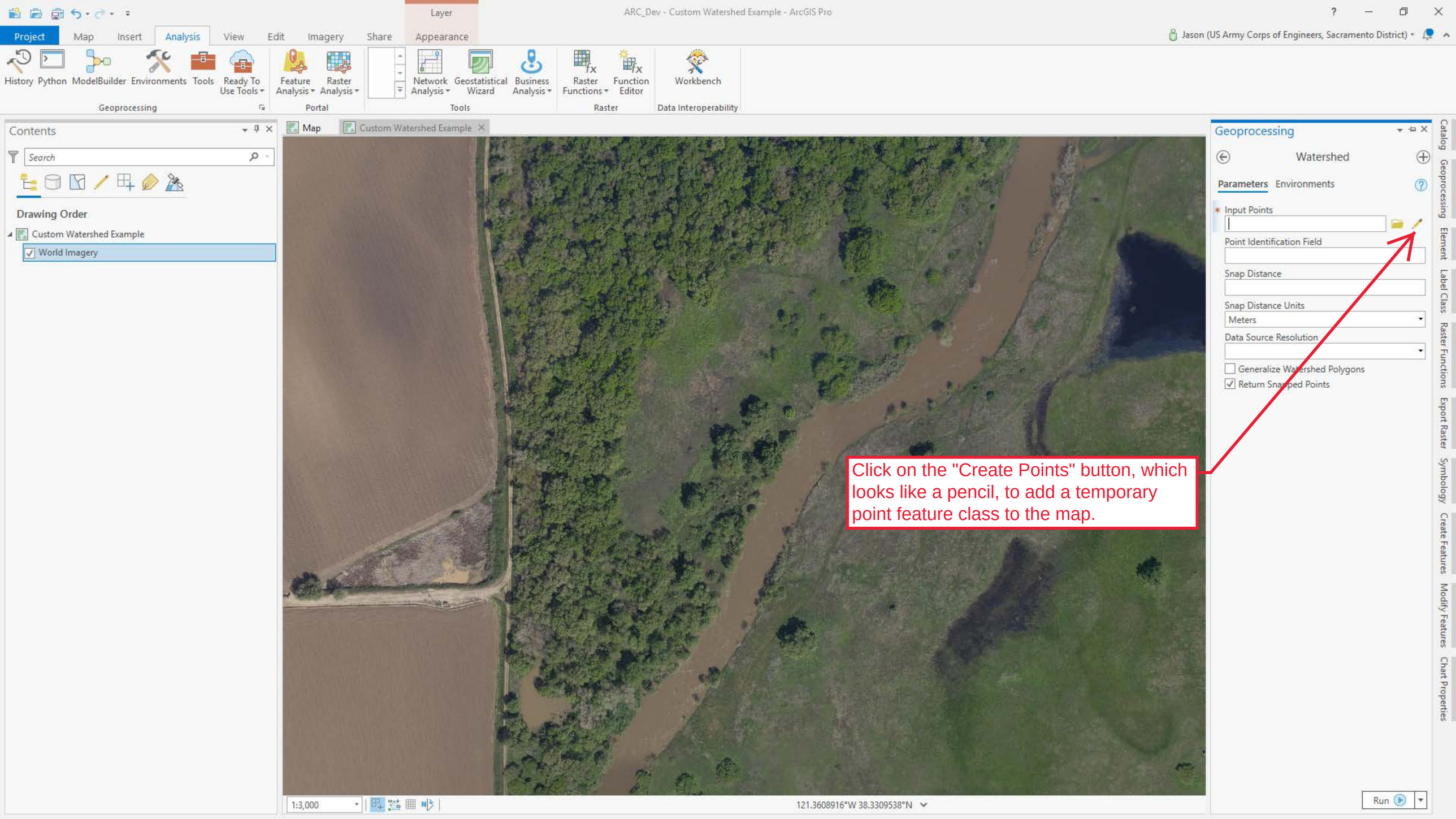
121.3670745°W 38.3325482°N
Selected Features: 0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Click on the "Create Points" button, which looks like a pencil, to add a temporary point feature class to the map.
Run
1:3,000
121.3608916°W 38.3309538°N
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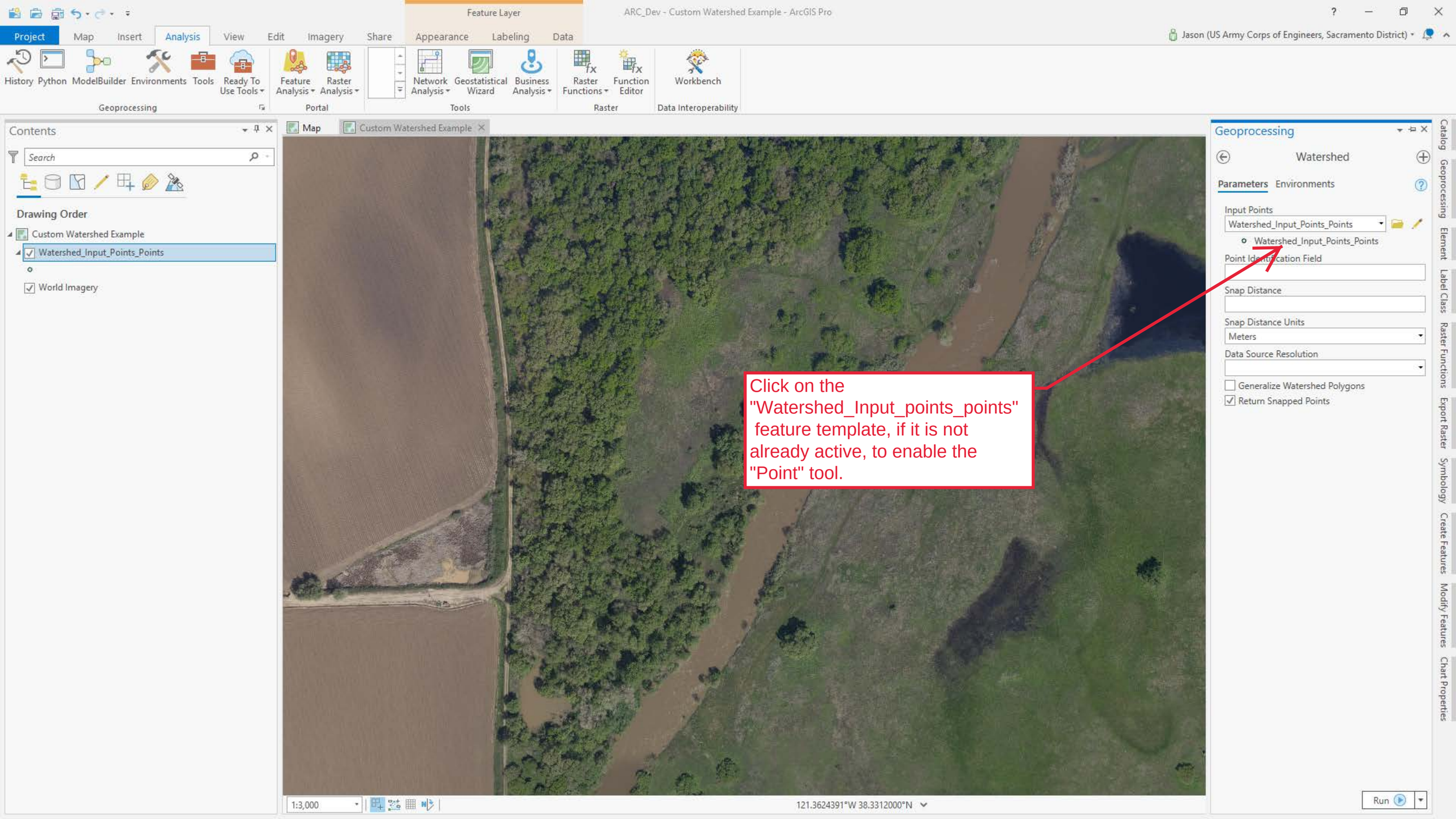
Chart Properties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Click on the "Watershed_Input_points_points" feature template, if it is not already active, to enable the "Point" tool.
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Snap Distance Units
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Return Snapped Points
Run
1:3,000
121.3624391°W 38.3312000°N
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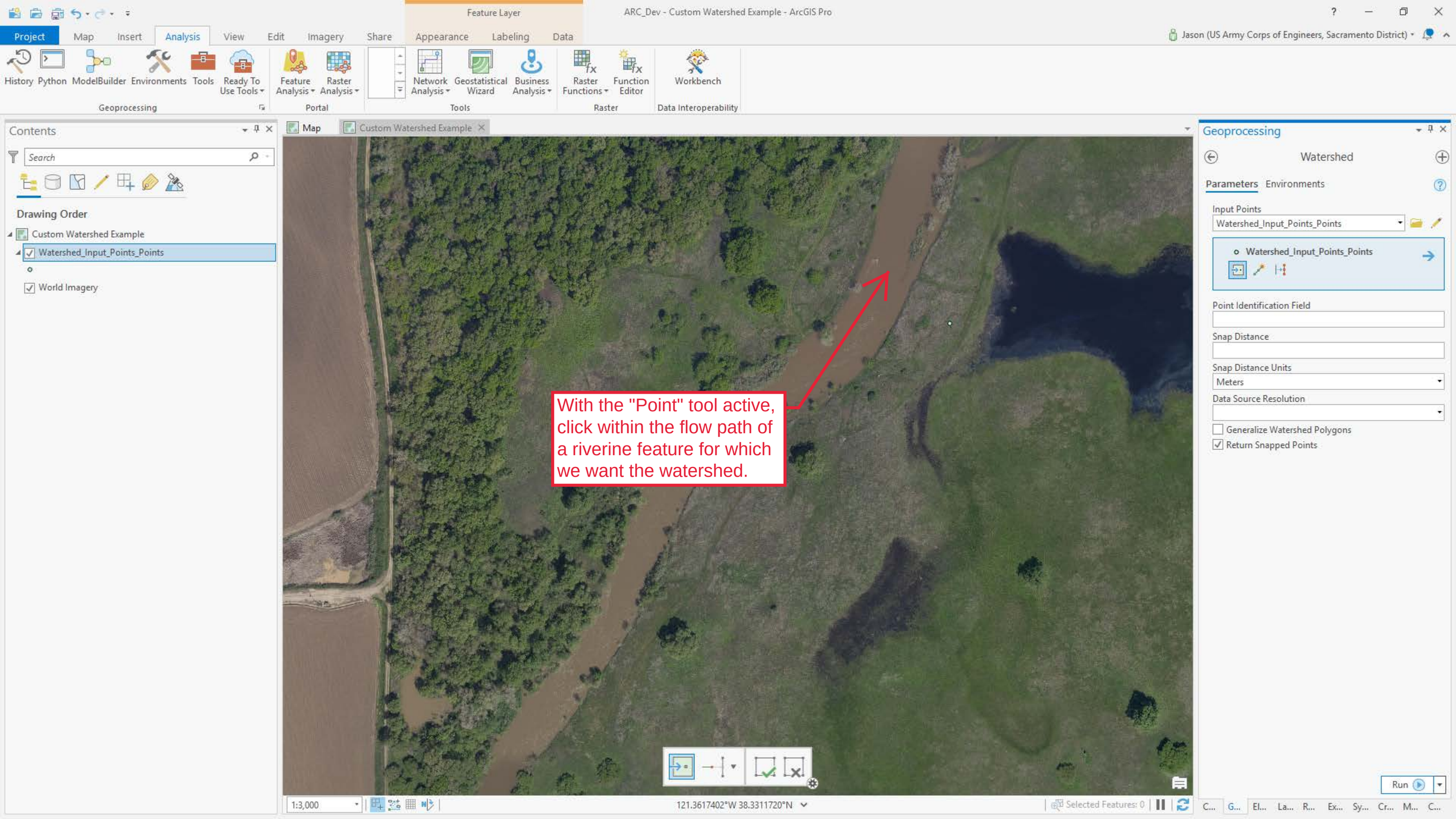
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With the "Point" tool active, click within the flow path of a riverine feature for which we want the watershed.
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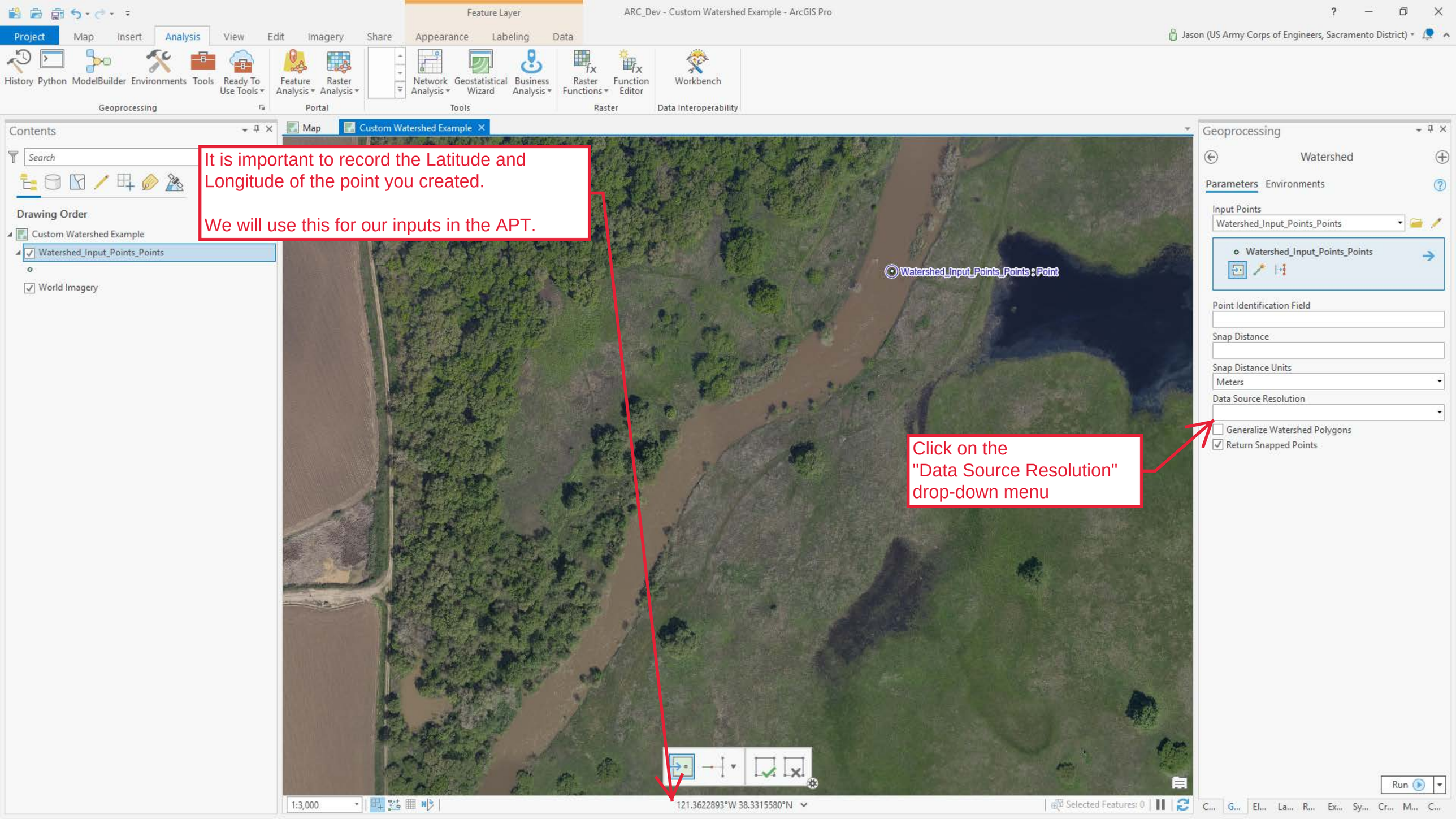
Generalize Watershed Polygons
Return Snapped Points
Run
1:3,000
121.3617402°W 38.3311720°N
Selected Features: 0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It is important to record the Latitude and Longitude of the point you created.
We will use this for our inputs in the APT.
Watershed_Input_Points_Points:Point
Click on the "Data Source Resolution" drop-down menu
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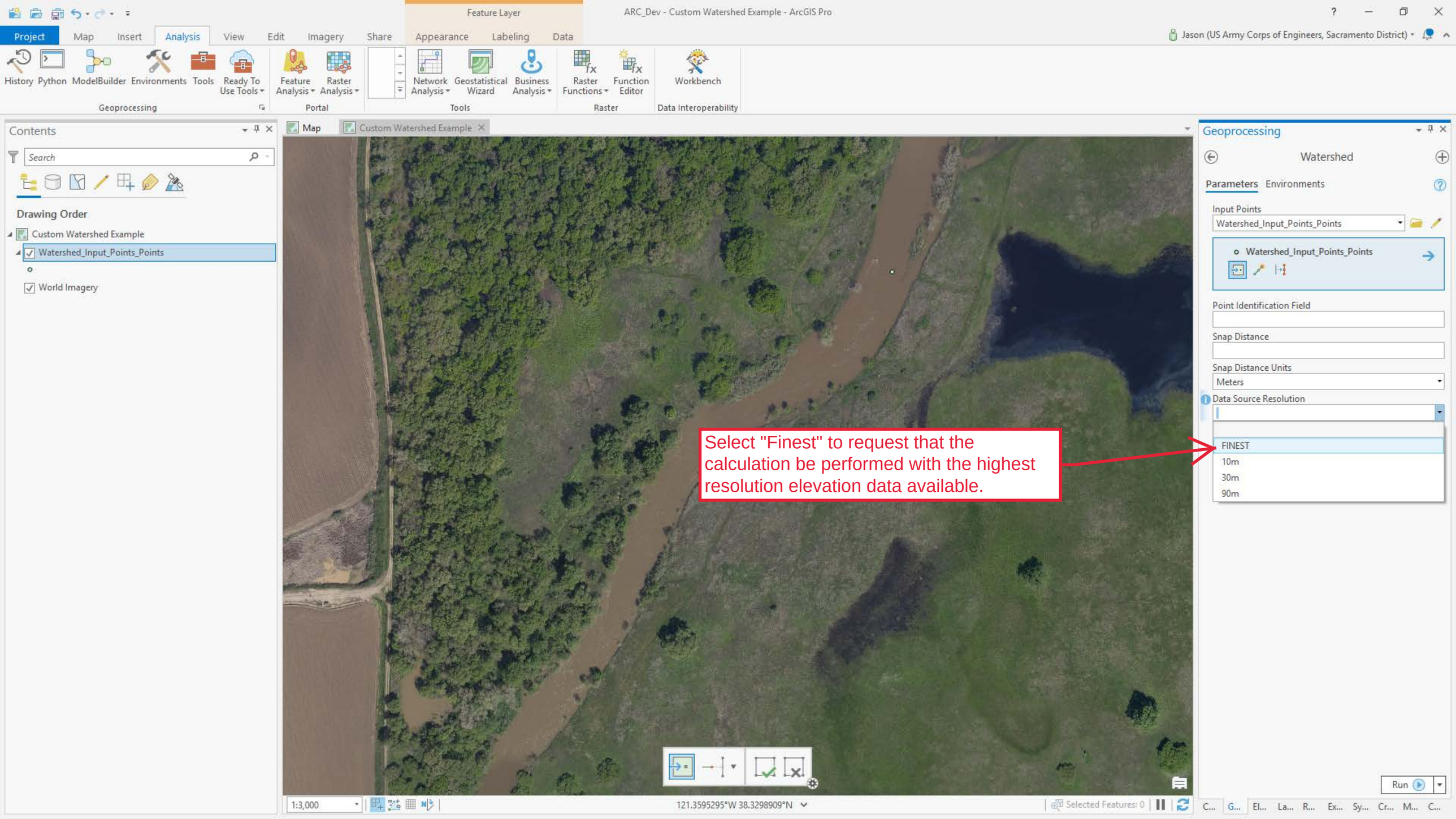
Run
1:3,000
121.3622893°W 38.3315580°N
Selected Features: 0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Select "Finest" to request that the calculation be performed with the highest resolution elevation data available.
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30m
90m
Run
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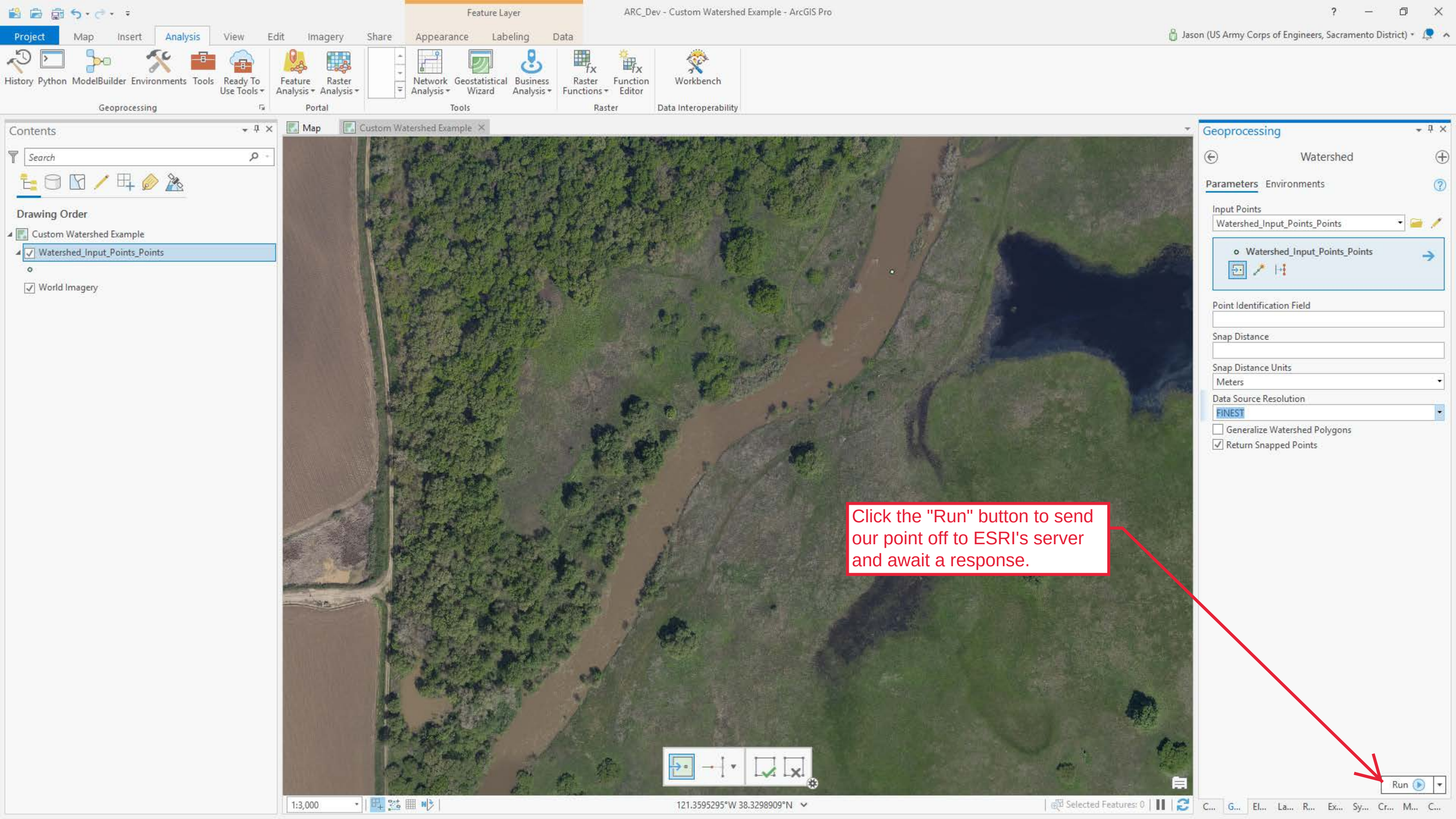
121.3595295°W 38.3298909°N
Selected Features: 0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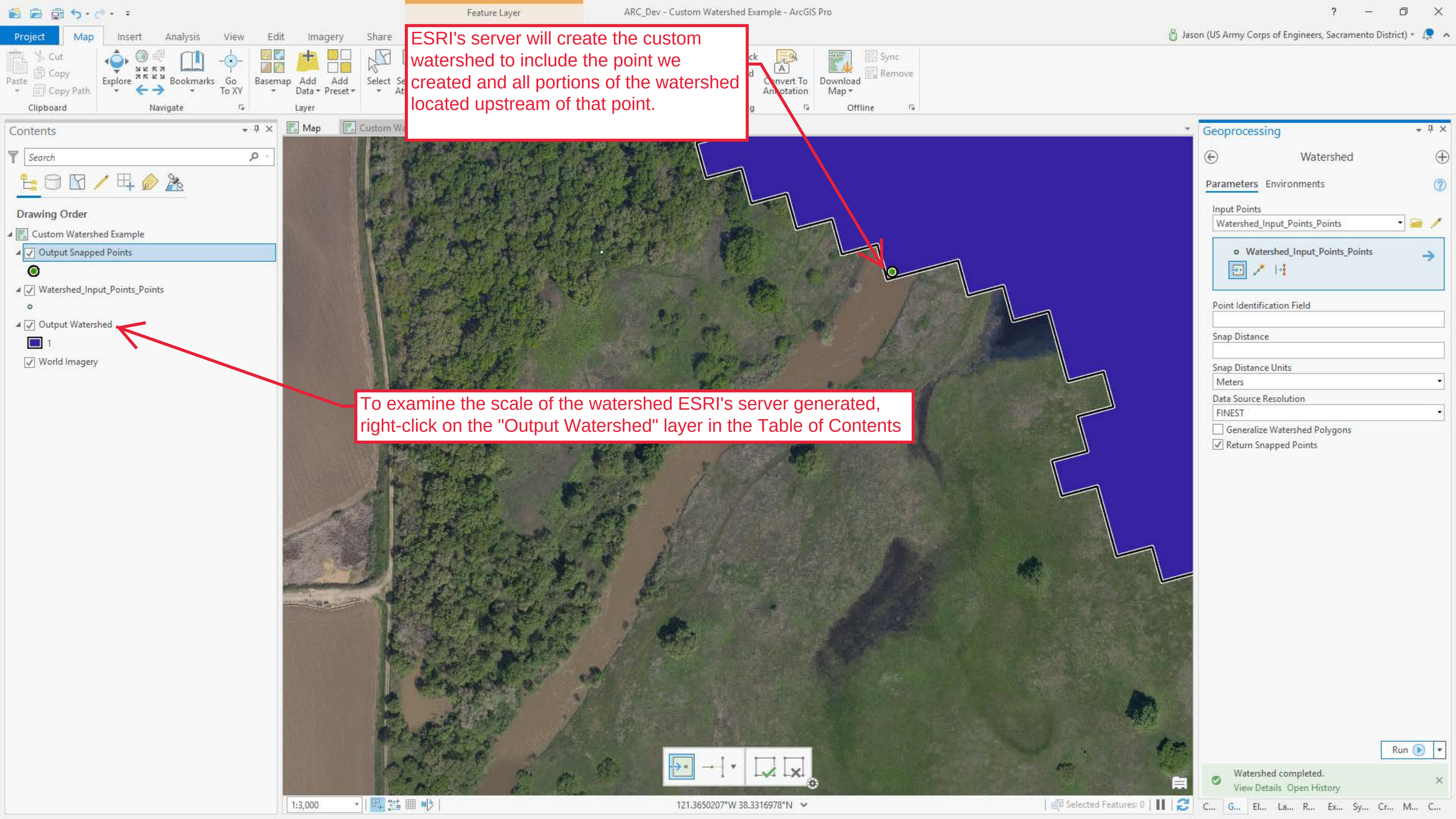
Click the "Run" button to send our point off to ESRI's server and await a response.
Run
1:3,000
121.3595295°W 38.3298909°N
Selected Features: 0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ESRI's server will create the custom watershed to include the point we created and all portions of the watershed located upstream of that point.
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To examine the scale of the watershed ESRI's server generated, right-click on the "Output Watershed" layer in the Table of Contents
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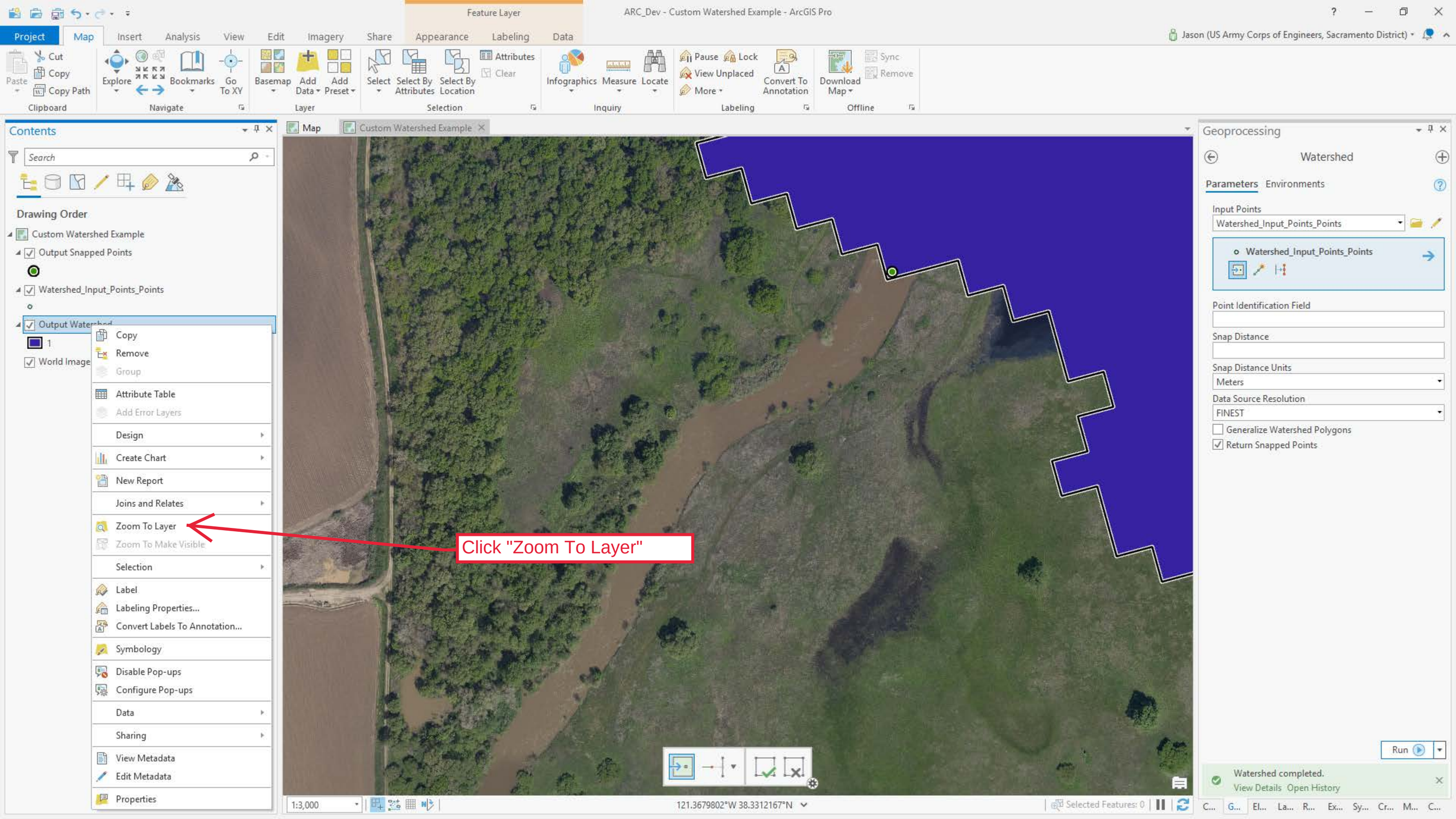
Return Snapped Points
Run
Watershed completed.
View Details
Open History
1:3,000
121.3650207°W 38.3316978°N
Selected Features: 0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Run
Watershed completed.
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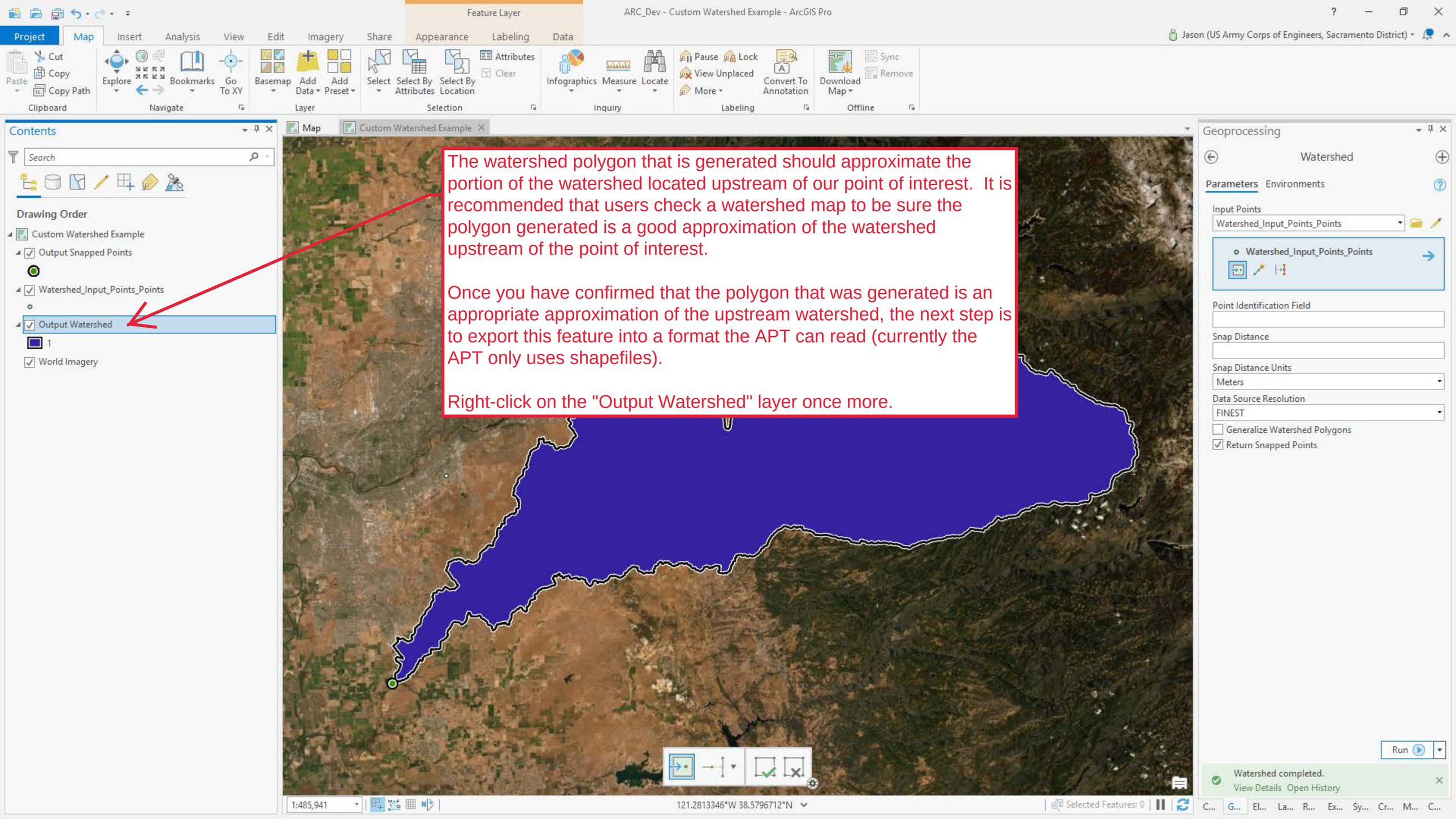
1:3,000
121.3679802°W 38.3312167°N
Selected Features: 0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The watershed polygon that is generated should approximate the portion of the watershed located upstream of our point of interest. It is recommended that users check a watershed map to be sure the polygon generated is a good approximation of the watershed upstream of the point of interest.
Once you have confirmed that the polygon that was generated is an appropriate approximation of the upstream watershed, the next step is to export this feature into a format the APT can read (currently the APT only uses shapefiles).
Right-click on the "Output Watershed" layer once more.
1:485,941
121.2813346°W 38.5796712°N
Selected Features: 0
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Watershed completed.
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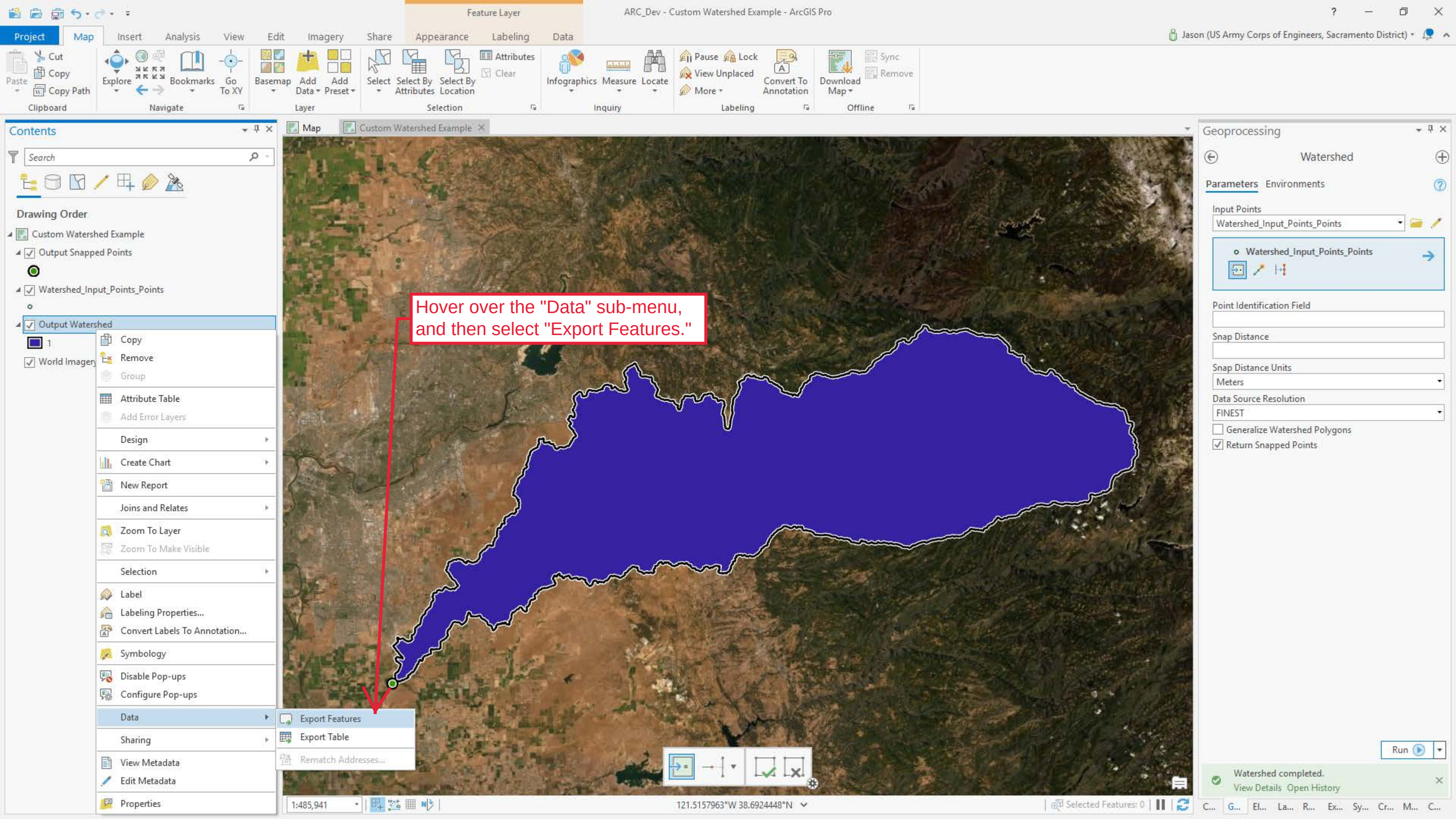
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Hover over the "Data" sub-menu, and then select "Export Features."
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Zoom To Make Visible
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Return Snapped Points
Run
Watershed completed.
View Details
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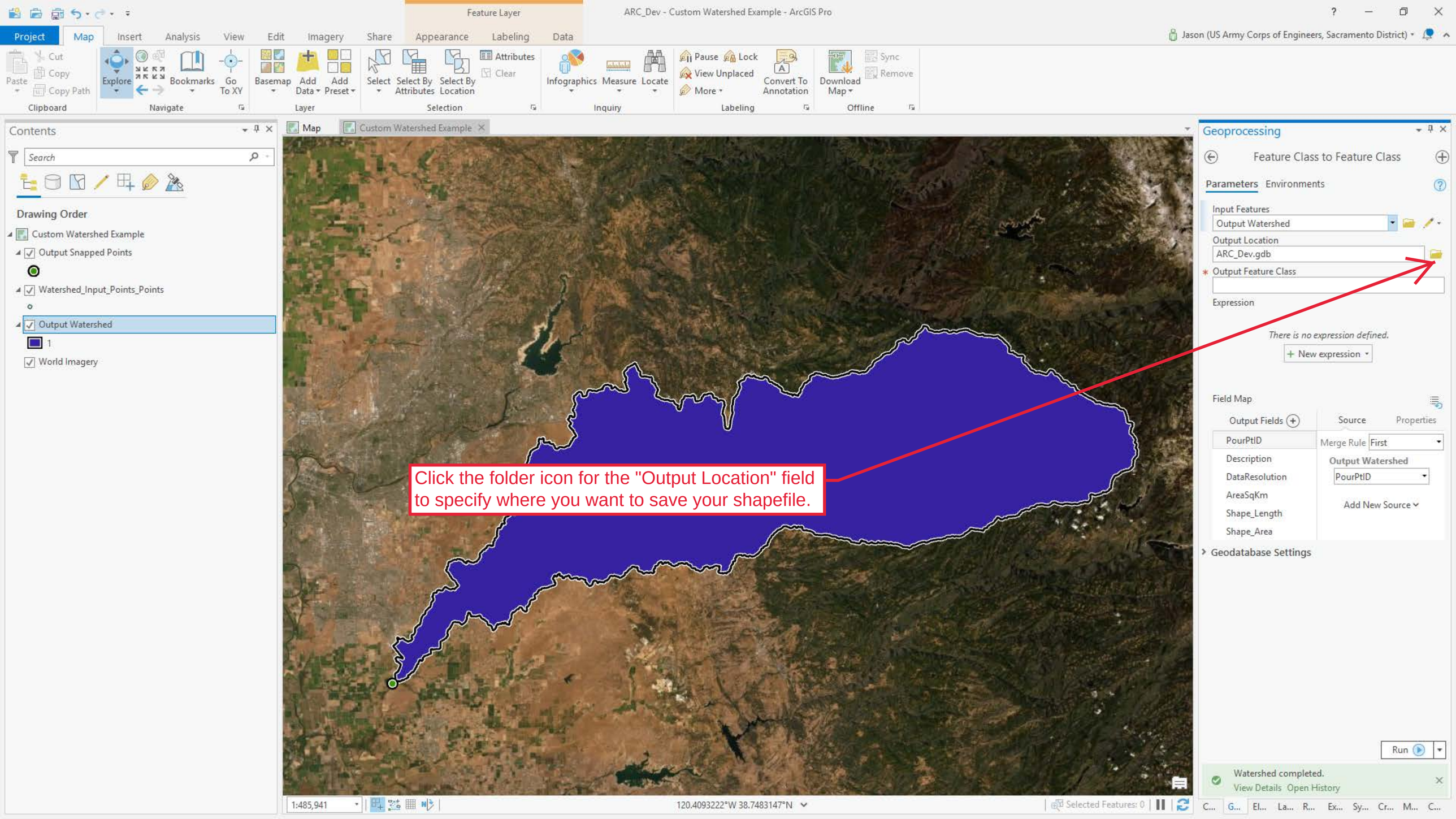
1:485,941
121.5157963°W 38.6924448°N
Selected Features: 0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Click the folder icon for the "Output Location" field to specify where you want to save your shapefile.
1:485,941
120.4093222°W 38.7483147°N
Selected Features: 0
Geoprocessing
Feature Class to Feature Class
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Output Location
ARC_Dev.gdb
Output Feature Class
Expression
There is no expression defined.
New expression
Field Map
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Add New Source
Shape_Length
Shape_Area
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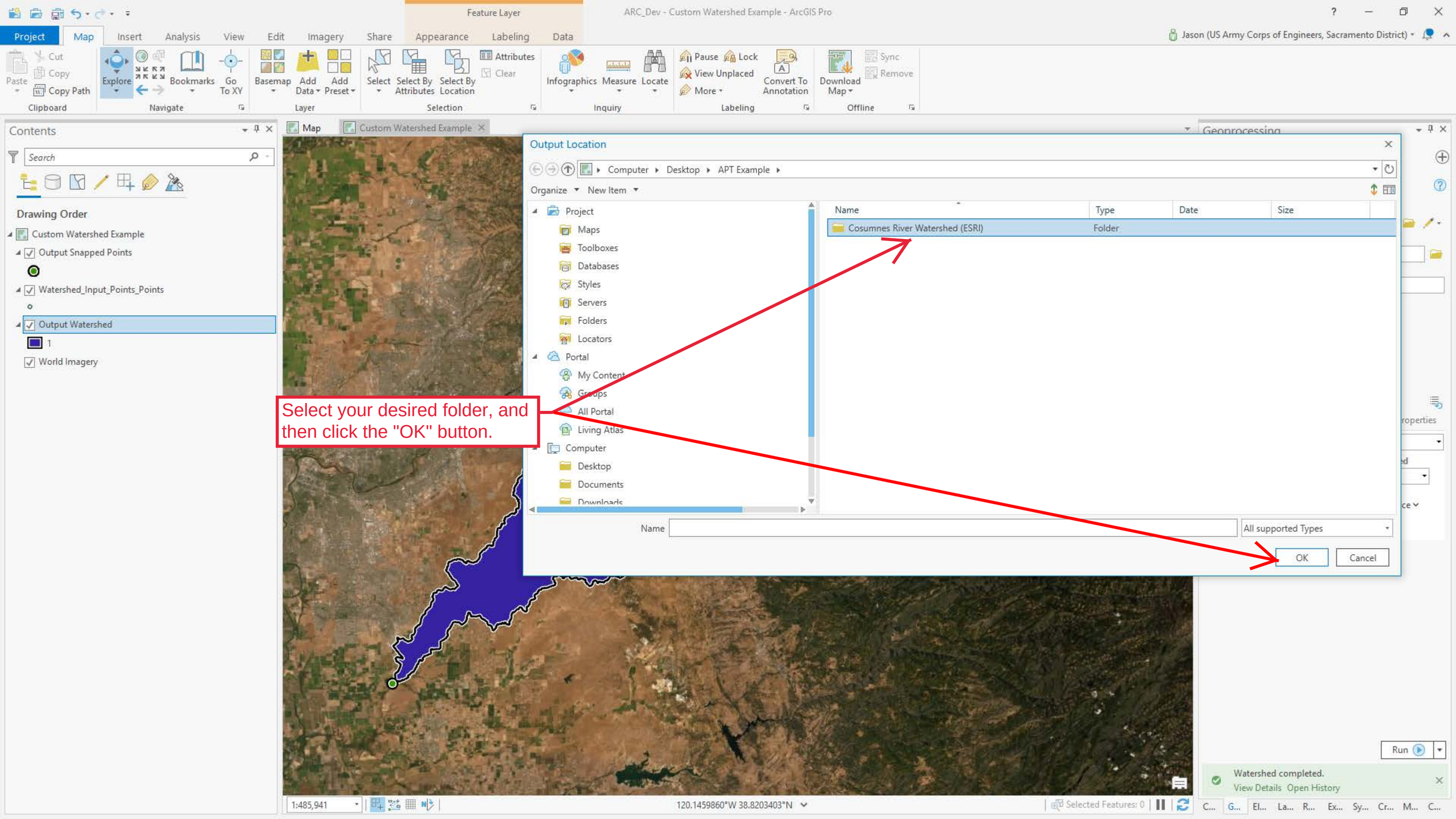
Run
Watershed completed.
View Details
Open History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Groups
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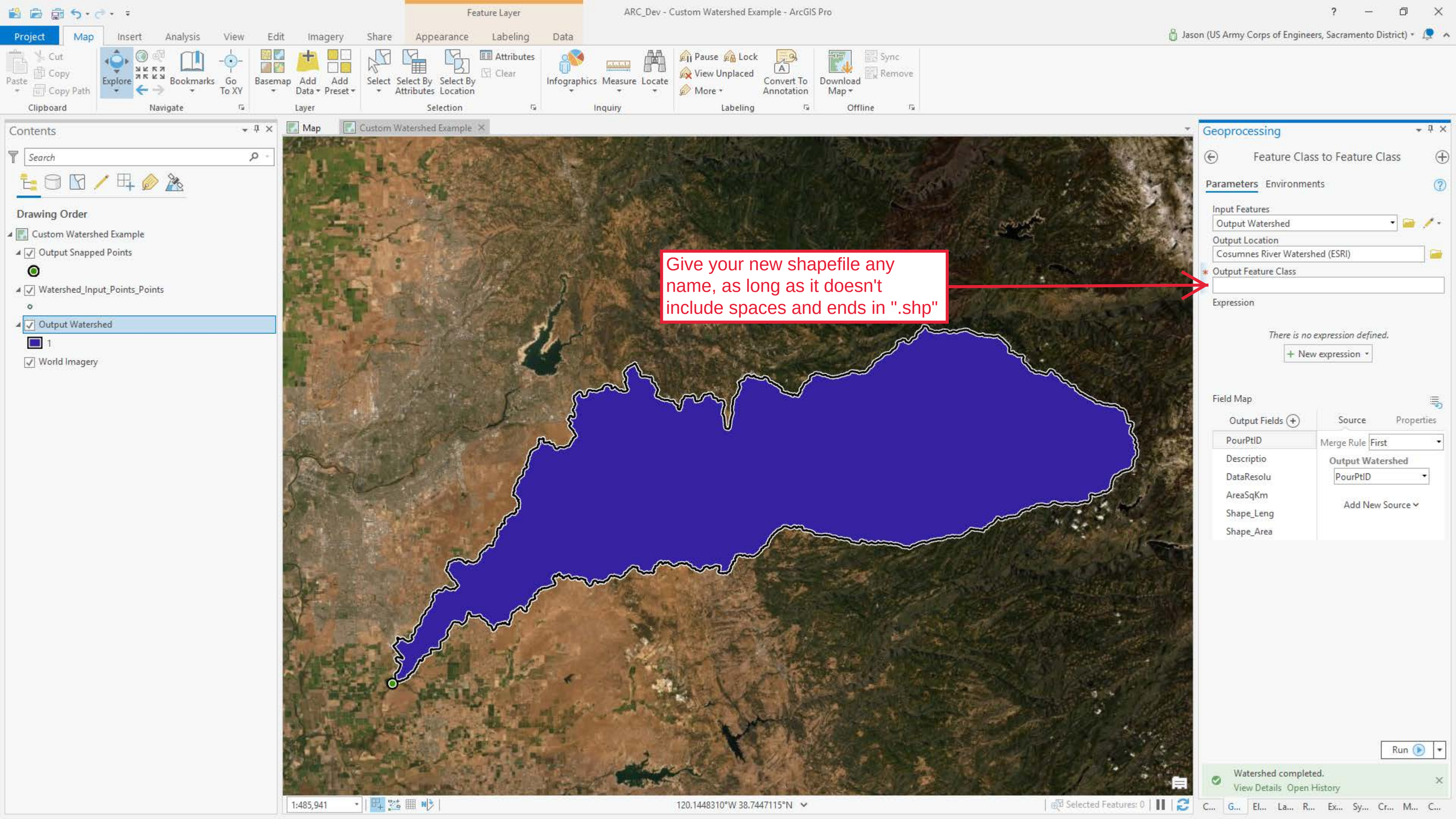
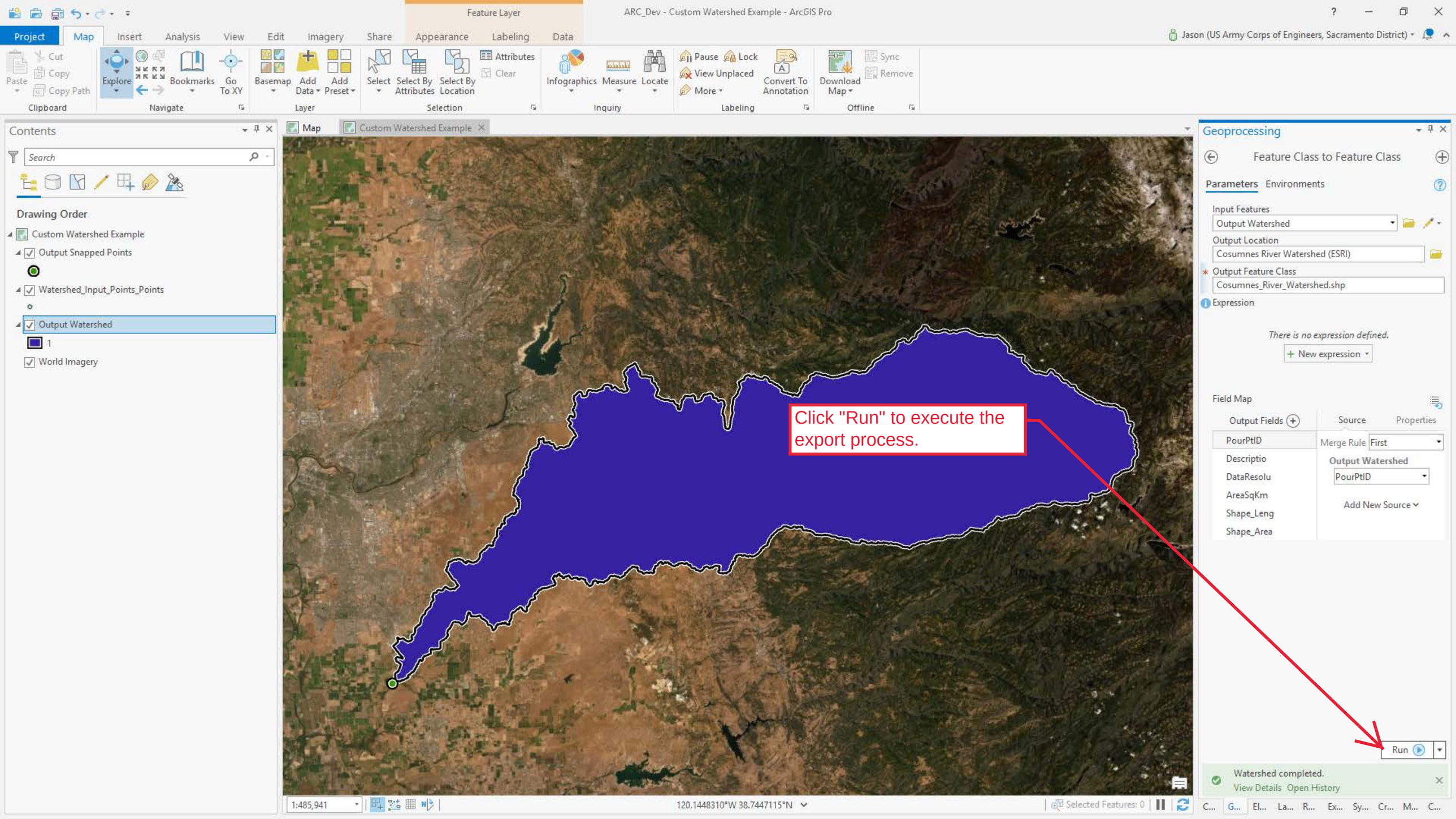
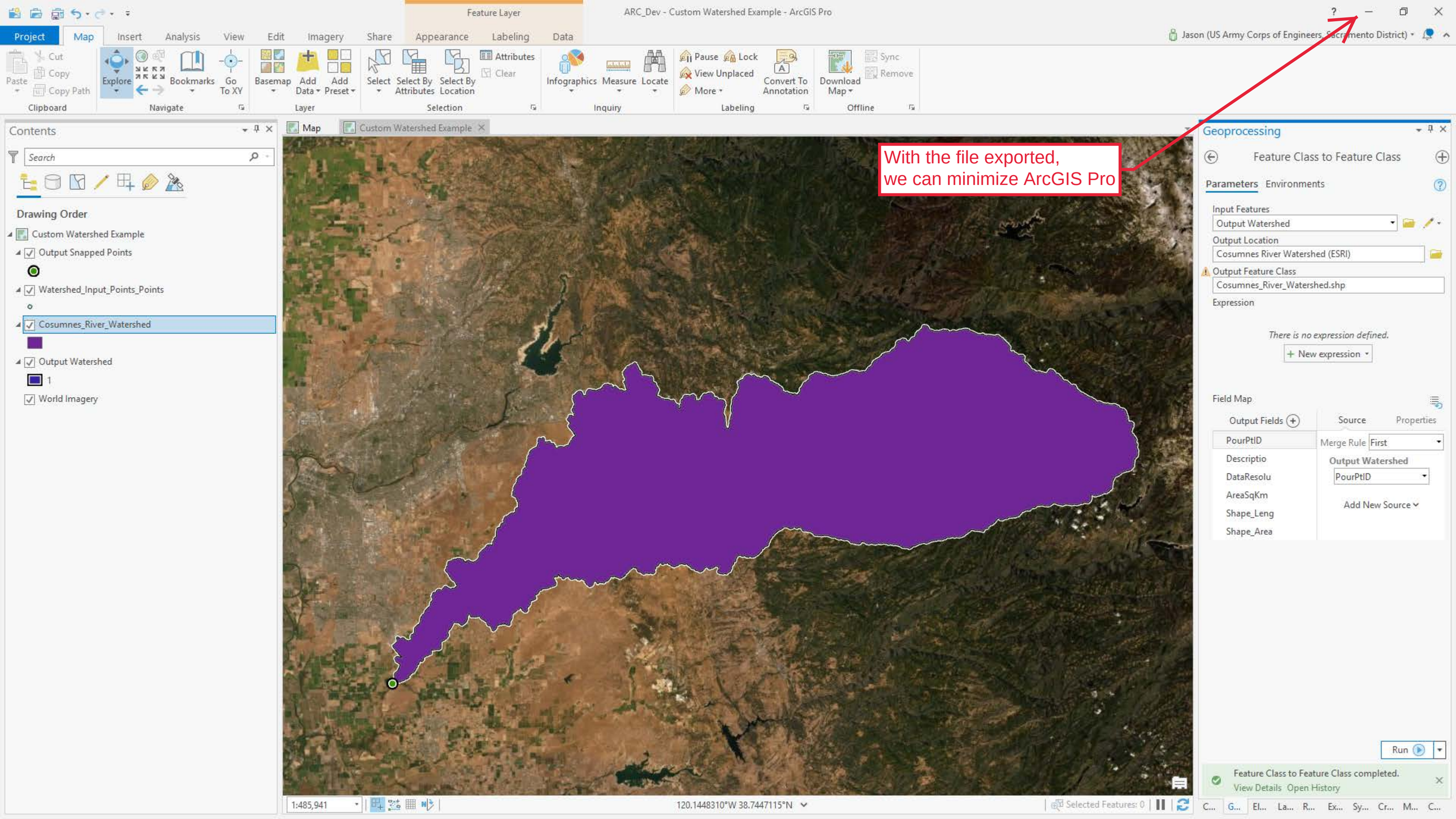
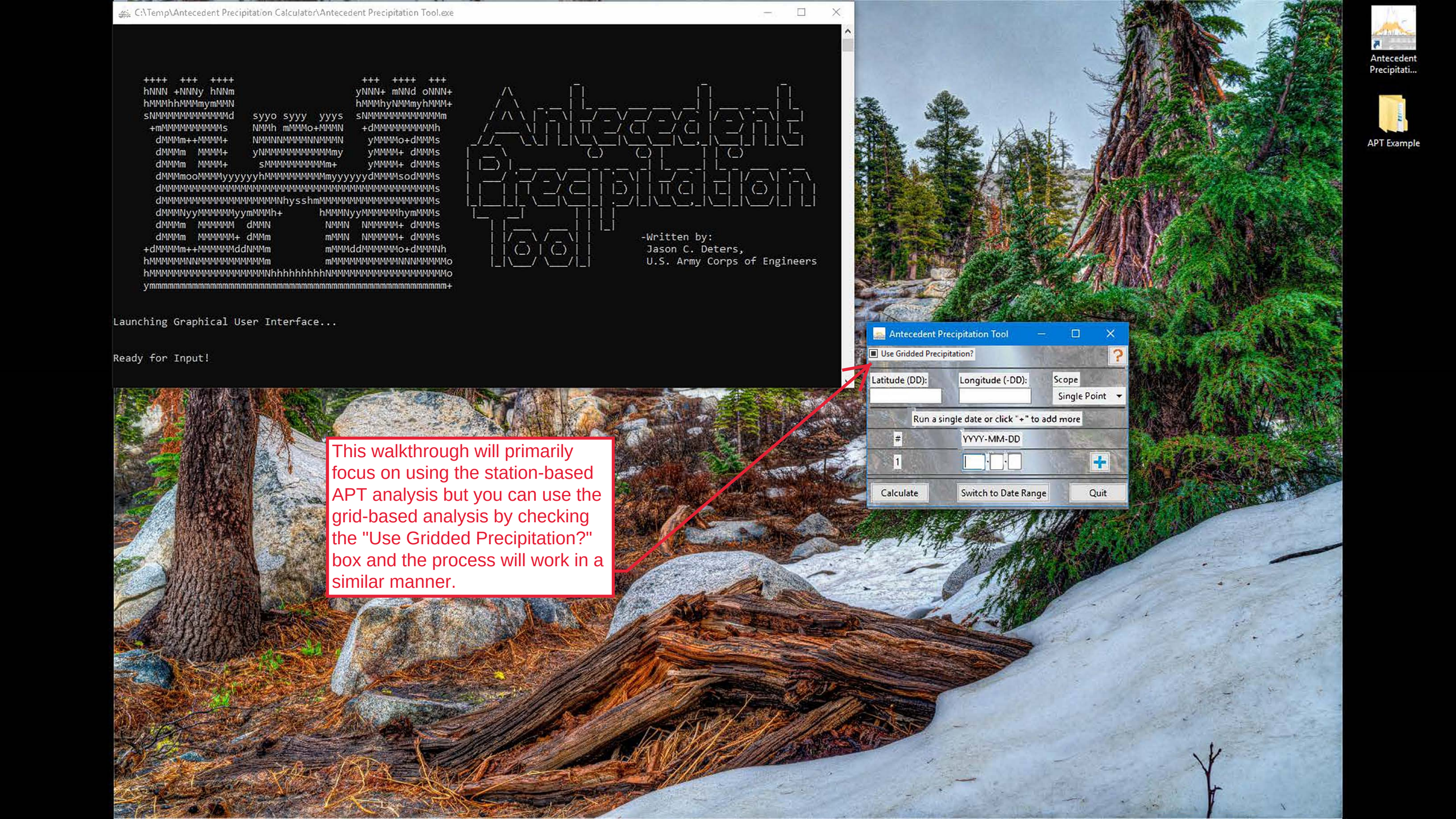
Name
All supported Types
OK
Cancel
Select your desired folder, and then click the "OK" button.
Run
Watershed completed.
View Details
Open History
1:485,941
120.1459860°W 38.8203403°N
Selected Features: 0

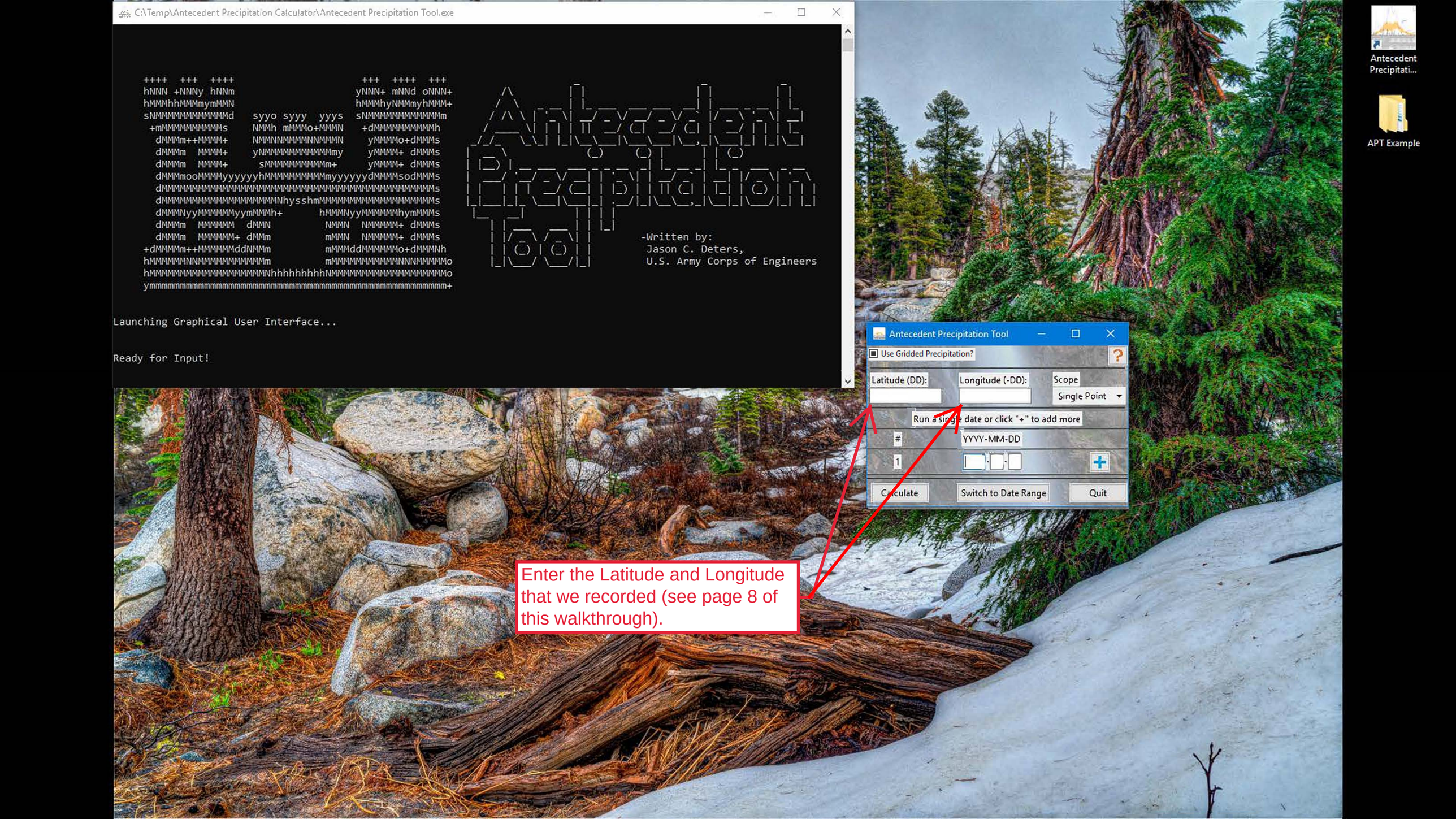

Feature Layer
ARC_Dev - Custom Watershed Example - ArcGIS Pro
Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Appearance
Labeling
Data
Jason (US Army Corps of Engineers, Sacramento District)
Cut
Copy
Copy Path
Paste
Clipboard
Explore
Bookmarks
Go To XY
Navigate
Basemap
Add Data
Add Preset
Layer
Select
Select By Attributes
Select By Location
Attributes
Clear
Selection
Infographics
Measure
Locate
Inquiry
Pause
Lock
View Unplaced
More
Convert To Annotation
Labeling
Download Map
Sync
Remove
Offline
Contents
Search
Drawing Order
Custom Watershed Example
Output Snapped Points
Watershed_Input_Points_Points
Output Watershed
1
World Imagery
Map
Custom Watershed Example
Give your new shapefile any name, as long as it doesn't include spaces and ends in ".shp"
1:485,941
120.1448310°W 38.7447115°N
Selected Features: 0
Geoprocessing
Feature Class to Feature Class
Parameters
Environments
Input Features
Output Watershed
Output Location
Cosumnes River Watershed (ESRI)
Output Feature Class
Expression
There is no expression defined.
New expression
Field Map
Output Fields
Source
Properties
PourPtID
Descriptio
DataResolu
AreaSqKm
Shape_Leng
Shape_Area
Merge Rule
First
Output Watershed
PourPtID
Add New Source
Run
Watershed completed.
View Details
Open History


Feature Layer
ARC_Dev - Custom Watershed Example - ArcGIS Pro
Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Appearance
Labeling
Data
Jason (US Army Corps of Engineers, Sacramento District)
Paste
Cut
Copy
Copy Path
Clipboard
Explore
Bookmarks
Go To XY
Navigate
Basemap
Add Data
Add Preset
Layer
Select
Select By Attributes
Select By Location
Attributes
Clear
Selection
Infographics
Measure
Locate
Inquiry
Pause
Lock
View Unplaced
More
Convert To Annotation
Labeling
Download Map
Sync
Remove
Offline
Contents
Search
Drawing Order
Custom Watershed Example
Output Snapped Points
Watershed_Input_Points_Points
Output Watershed
1
World Imagery
Map
Custom Watershed Example
Click "Run" to execute the export process.
1:485,941
120.1448310°W 38.7447115°N
Selected Features: 0
Geoprocessing
Feature Class to Feature Class
Parameters
Environments
Input Features
Output Watershed
Output Location
Cosumnes River Watershed (ESRI)
Output Feature Class
Cosumnes_River_Watershed.shp
Expression
There is no expression defined.
New expression
Field Map
Output Fields
Source
Properties
PourPtID
Descriptio
DataResolu
AreaSqKm
Shape_Leng
Shape_Area
Merge Rule
First
Output Watershed
PourPtID
Add New Source
Run
Watershed completed.
View Details
Open History

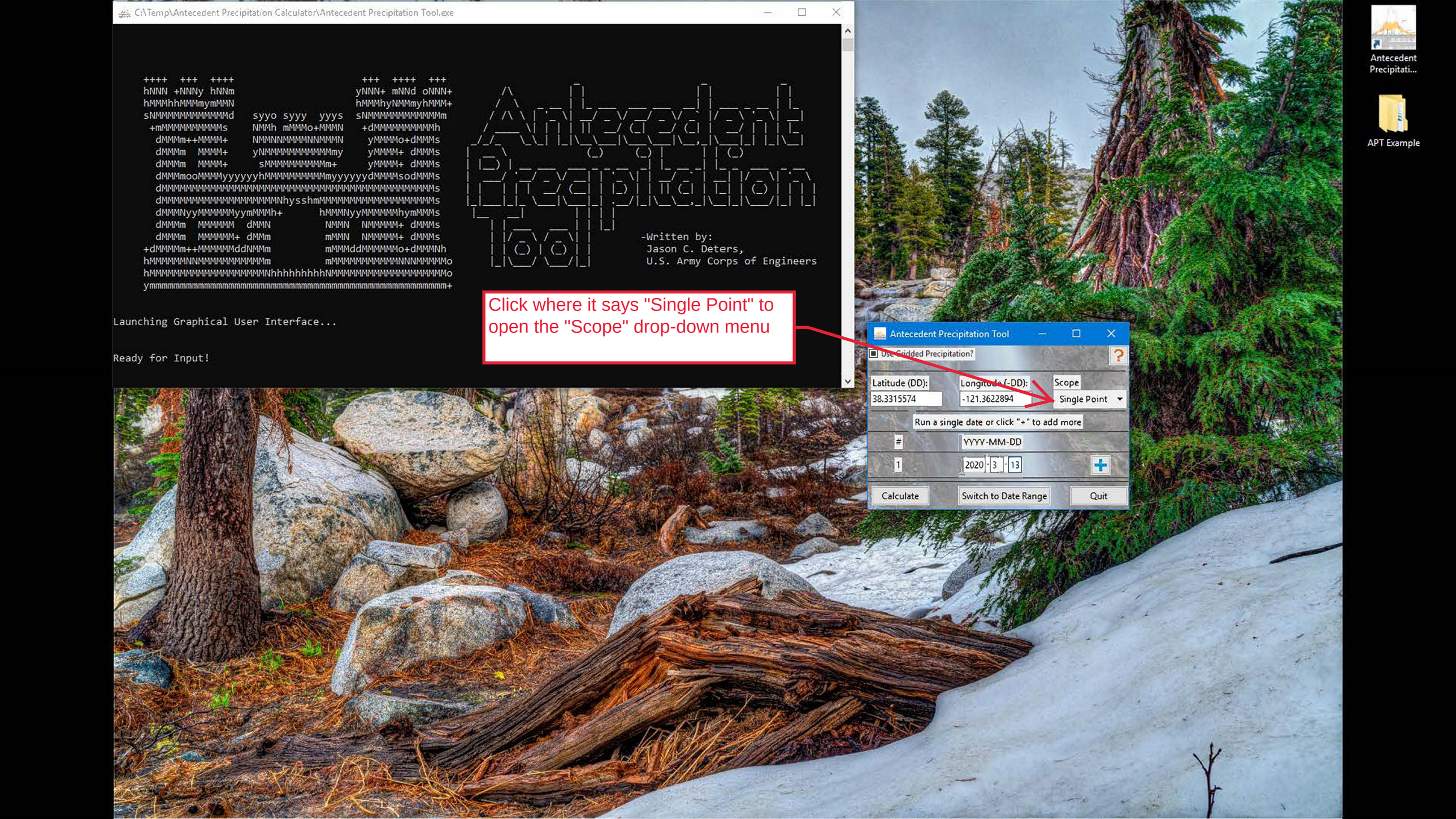

Feature Layer
ARC_Dev - Custom Watershed Example - ArcGIS Pro
Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Appearance
Labeling
Data
Jason (US Army Corps of Engineers, Sacramento District)
Cut
Copy
Paste
Copy Path
Clipboard
Explore
Bookmarks
Go To XY
Navigate
Basemap
Add Data
Add Preset
Layer
Select
Select By Attributes
Select By Location
Attributes
Clear
Selection
Infographics
Measure
Locate
Inquiry
Pause
Lock
View Unplaced
More
Convert To Annotation
Labeling
Download Map
Sync
Remove
Offline
Contents
Search
Drawing Order
Custom Watershed Example
Output Snapped Points
Watershed_Input_Points_Points
Cosumnes_River_Watershed
Output Watershed
1
World Imagery
Map
Custom Watershed Example
With the file exported,
we can minimize ArcGIS Pro
Geoprocessing
Feature Class to Feature Class
Parameters
Environments
Input Features
Output Watershed
Output Location
Cosumnes River Watershed (ESRI)
Output Feature Class
Cosumnes_River_Watershed.shp
Expression
There is no expression defined.
New expression
Field Map
Output Fields
Source
Properties
PourPtID
Descriptio
DataResolu
AreaSqKm
Shape_Leng
Shape_Area
Merge Rule
First
Output Watershed
PourPtID
Add New Source
Run
Feature Class to Feature Class completed.
View Details
Open History
1:485,941
120.1448310°W 38.7447115°N
Selected Features: 0

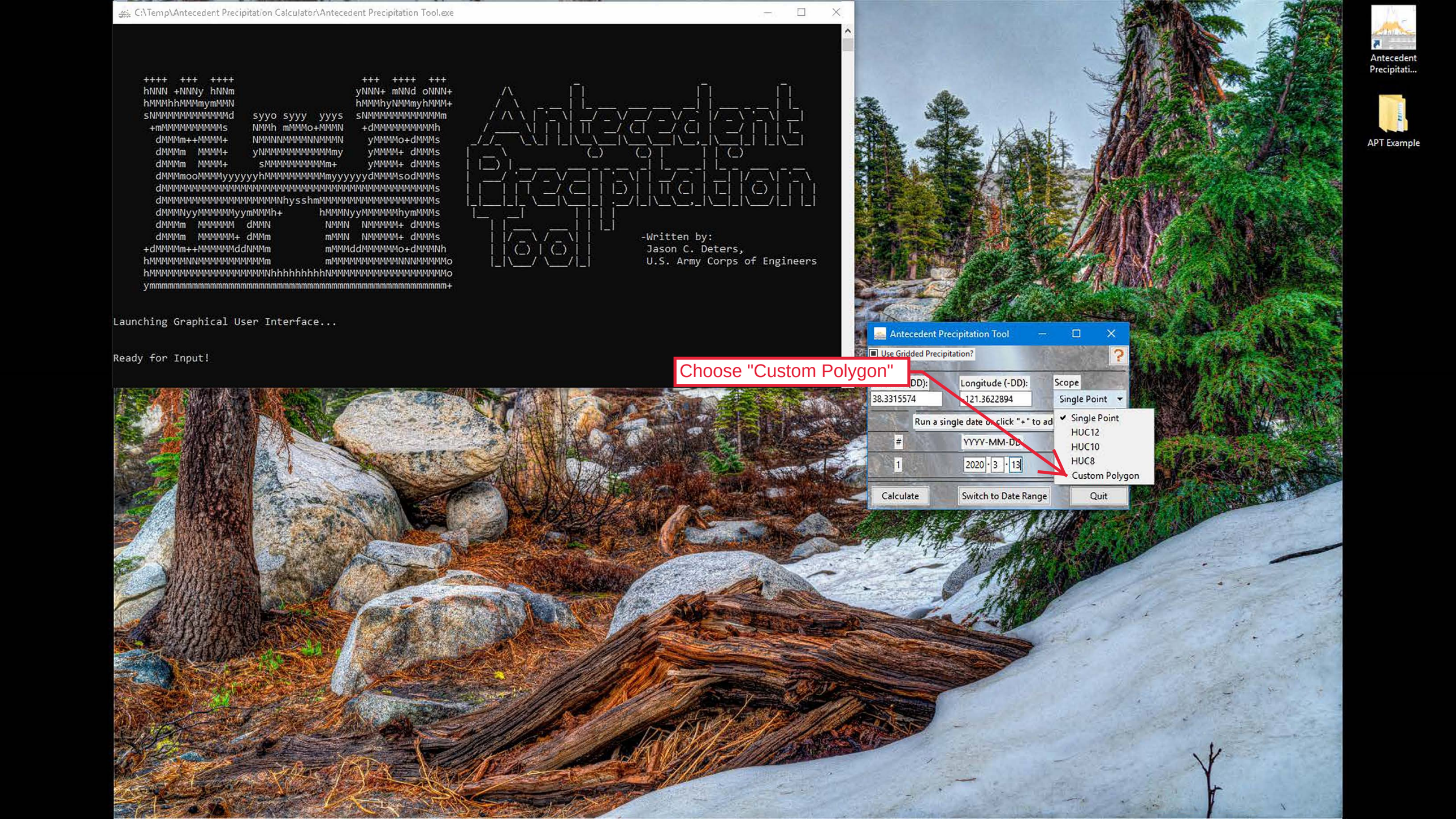

Antecedent Precipitati...
APT Example
Launch the APT

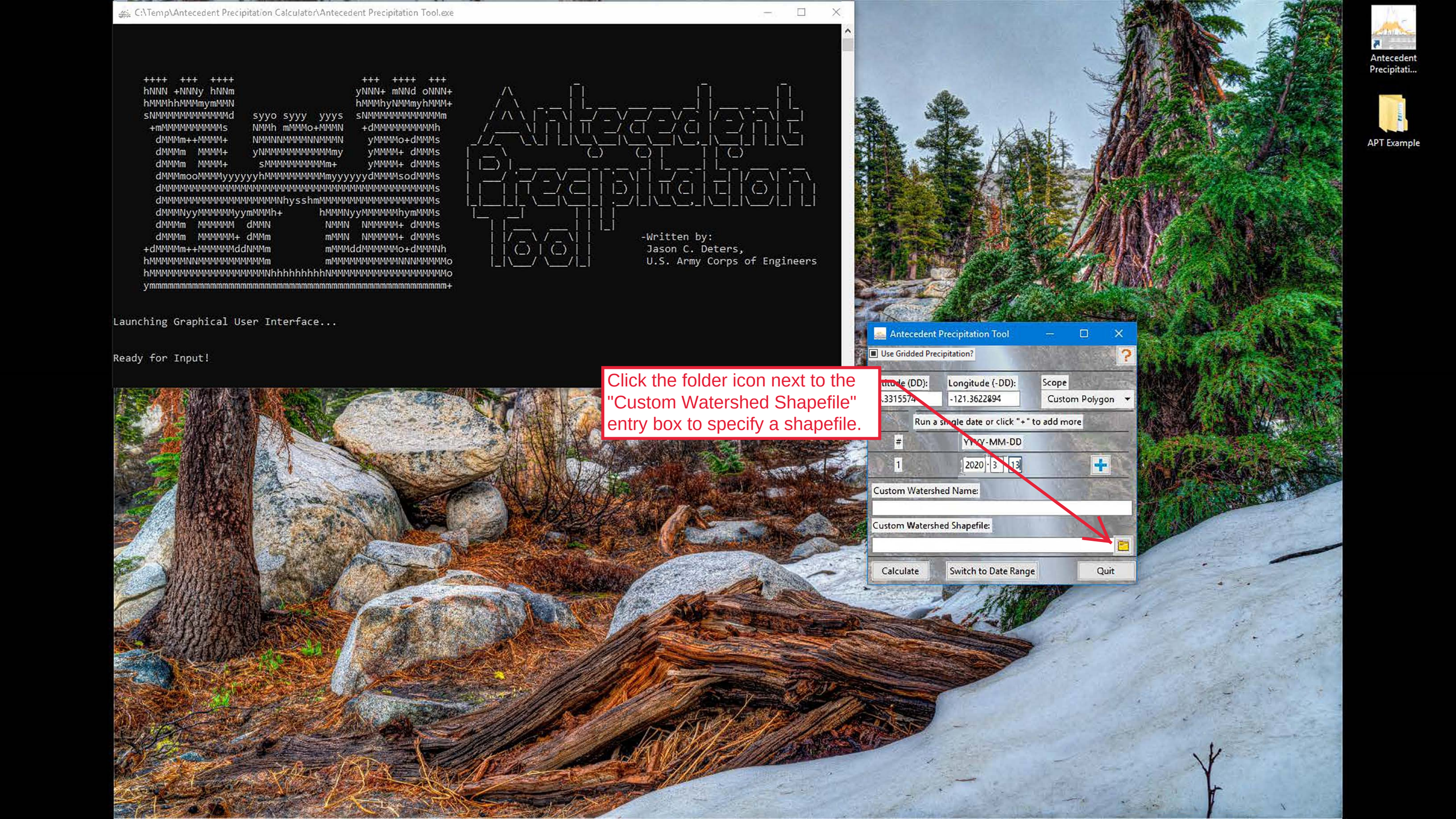

C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
Longitude (-DD):
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
Calculate
Switch to Date Range
Quit
This walkthrough will primarily focus on using the station-based APT analysis but you can use the grid-based analysis by checking the "Use Gridded Precipitation?" box and the process will work in a similar manner.
Antecedent Precipitati...
APT Example

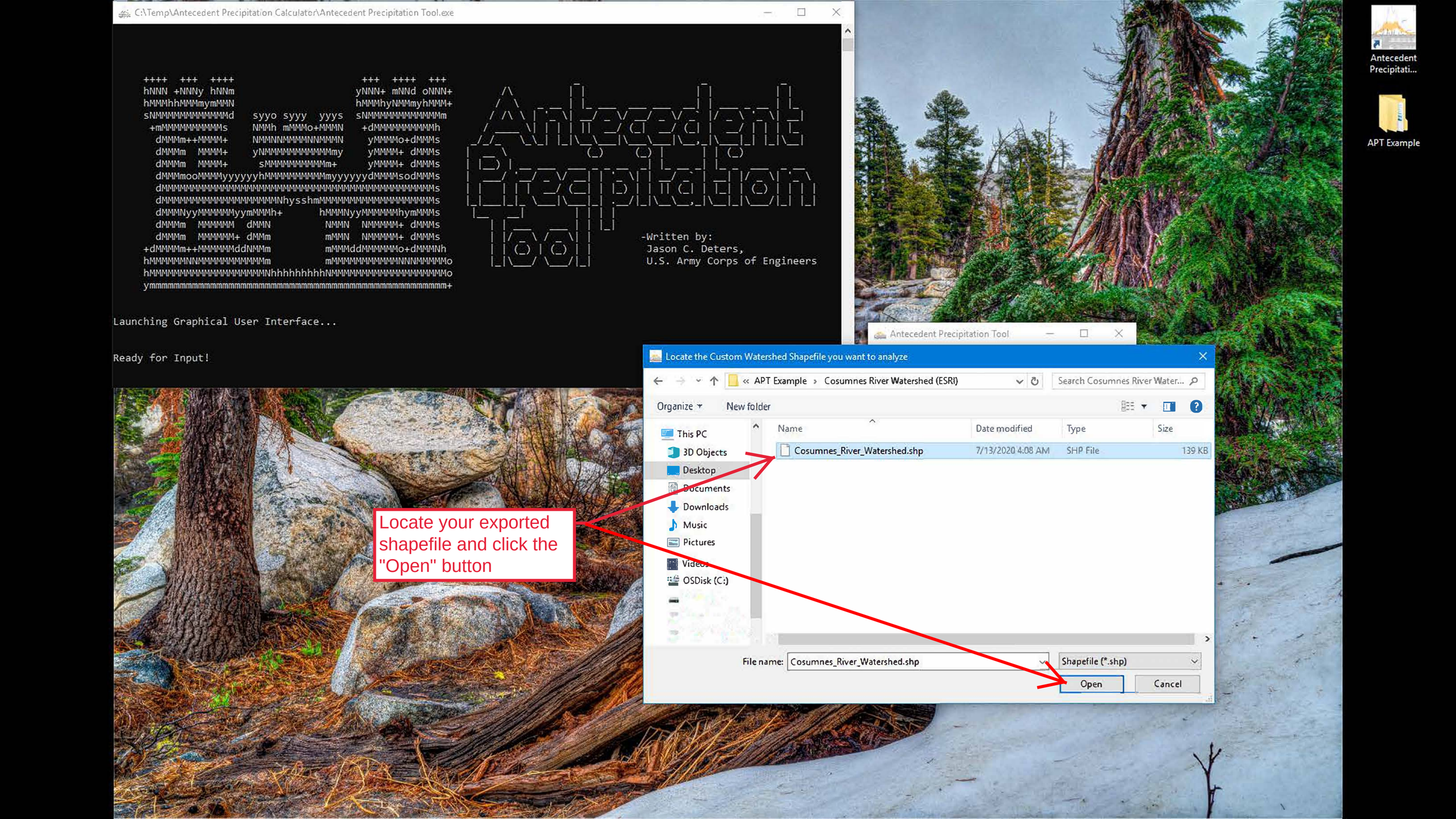

C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
Longitude (-DD):
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
Calculate
Switch to Date Range
Quit
Enter the Latitude and Longitude that we recorded (see page 8 of this walkthrough).
Antecedent Precipitati...
APT Example

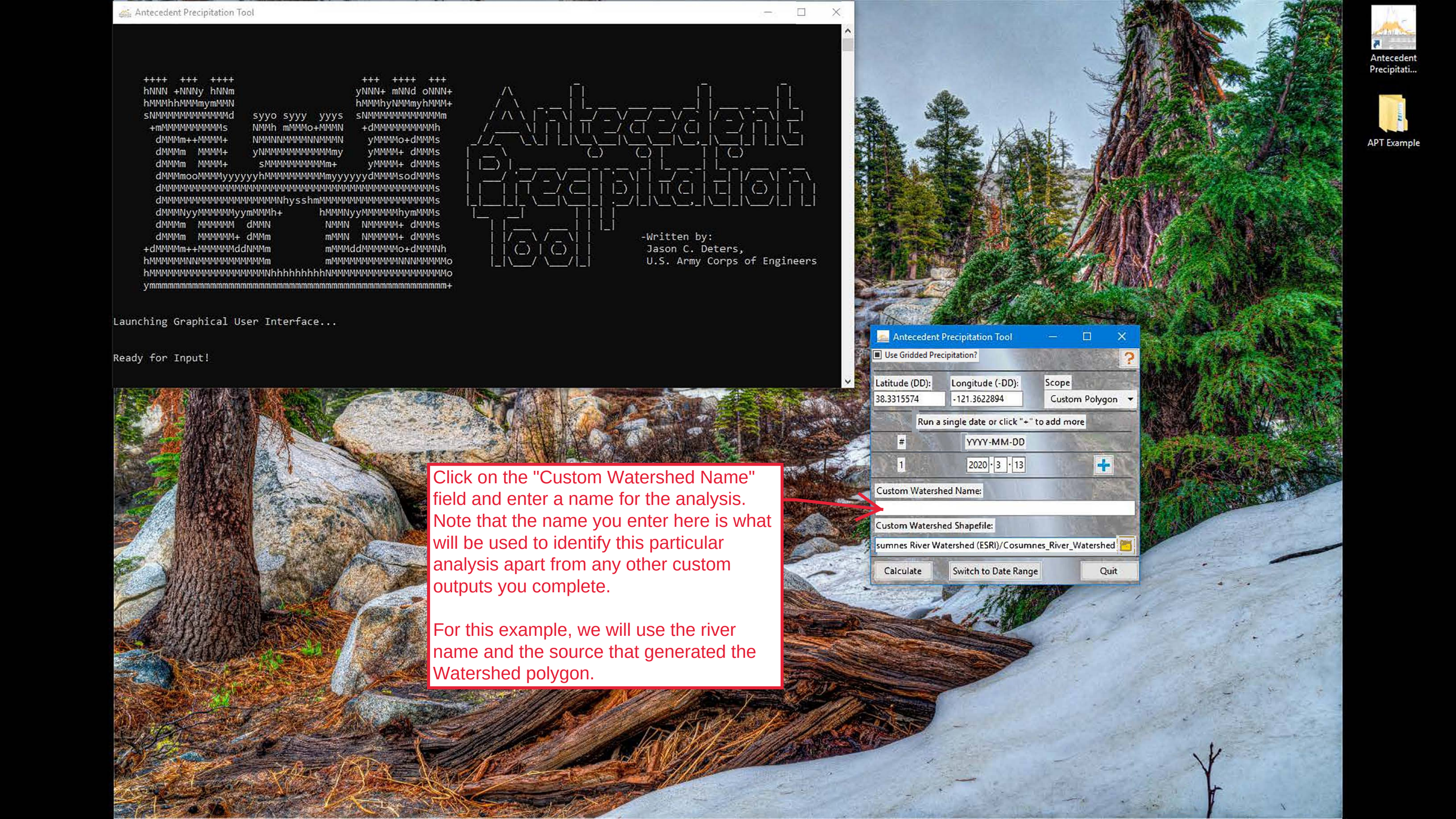

C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
38.3315574
Longitude (-DD):
-121.3622894
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
Calculate
Switch to Date Range
Quit
Enter a date of interest
in (YYYY-MM-DD) format

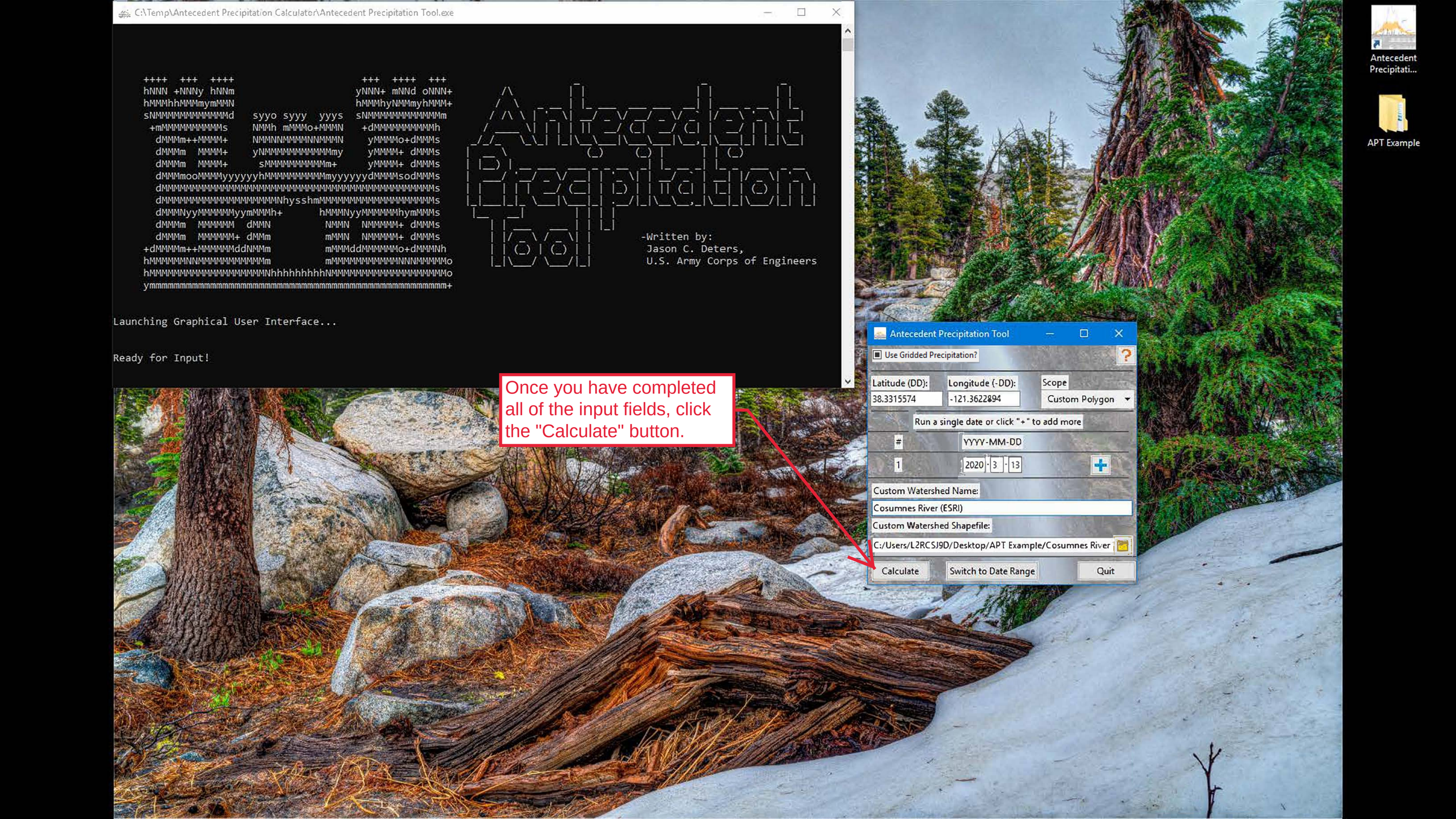

C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Click where it says "Single Point" to open the "Scope" drop-down menu
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
38.3315574
Longitude (-DD):
-121.3622894
Scope
Single Point
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
2020 - 3 - 13
Calculate
Switch to Date Range
Quit
Antecedent Precipitati...
APT Example


C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Use Gridded Precipitation?
Longitude (-DD):
Scope
38.3315574
121.3622894
Single Point
Single Point
HUC12
HUC10
HUC8
Custom Polygon
YYYY-MM-DD
2020 · 3 · 13
Calculate
Switch to Date Range
Quit
Choose "Custom Polygon"
Antecedent Precipitati...
APT Example


C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
Longitude (-DD):
Scope
-121.3622894
Custom Polygon
Run a single date or click "+" to add more
YYYY-MM-DD
2020
3
13
Custom Watershed Name:
Custom Watershed Shapefile:
Calculate
Switch to Date Range
Quit
Click the folder icon next to the "Custom Watershed Shapefile" entry box to specify a shapefile.
Antecedent Precipitati...
APT Example


C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Locate the Custom Watershed Shapefile you want to analyze
APT Example
Cosumnes River Watershed (ESRI)
Search Cosumnes River Water...
Organize
New folder
This PC
3D Objects
Desktop
Documents
Downloads
Music
Pictures
Videos
OSDisk (C:)
Name
Date modified
Type
Size
Cosumnes_River_Watershed.shp
7/13/2020 4:08 AM
SHP File
139 KB
File name:
Cosumnes_River_Watershed.shp
Shapefile (*.shp)
Open
Cancel
Locate your exported shapefile and click the "Open" button
Antecedent Precipitati...
APT Example


Antecedent Precipitation Tool
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
Longitude (-DD):
Scope
38.3315574
-121.3622894
Custom Polygon
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
2020 - 3 - 13
Custom Watershed Name:
Custom Watershed Shapefile:
sumnes River Watershed (ESRI)/Cosumnes_River_Watershed
Calculate
Switch to Date Range
Quit
Click on the "Custom Watershed Name" field and enter a name for the analysis. Note that the name you enter here is what will be used to identify this particular analysis apart from any other custom outputs you complete.
For this example, we will use the river name and the source that generated the Watershed polygon.
Antecedent Precipitati...
APT Example


C:\Temp\Antecedent Precipitation Calculator\Antecedent Precipitation Tool.exe
-Written by:
Jason C. Deters,
U.S. Army Corps of Engineers
Launching Graphical User Interface...
Ready for Input!
Once you have completed all of the input fields, click the "Calculate" button.
Antecedent Precipitation Tool
Use Gridded Precipitation?
Latitude (DD):
Longitude (-DD):
Scope
38.3315574
-121.3622894
Custom Polygon
Run a single date or click "+" to add more
#
YYYY-MM-DD
1
2020 - 3 - 13
Custom Watershed Name:
Cosumnes River (ESRI)
Custom Watershed Shapefile:
C:/Users/L2RCSJ9D/Desktop/APT Example/Cosumnes River
Calculate
Switch to Date Range
Quit
Antecedent Precipitati...
APT Example

The rest of the procedure follows the same steps that are outlined in the "How to generate a watershed analysis using the USGS Watershed Boundary Dataset" document, which is available from the Help Menu.

Information about the output this process generates can be found in the "How to read the output of a Watershed analysis" document also available in the Help Menu.