

# Quiet Creek Corporation



*Unmanned Aerial Mapping*

# *Agenda*

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- Who we are
- What we do
- Collect
- Process
- Analyze
- Example: Hydrologic Modeling / Analysis
- Questions

# *Who we are*

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- Quiet Creek Corporation
  - Veteran owned small business
  - AZ corporation in good standing
  - Pima / UofA / Federal vendor
  - Responsible and insured
  - Fully compliant with AZ and federal UAS laws
  - [www.thequietcreek.com](http://www.thequietcreek.com)



# *What we do...*

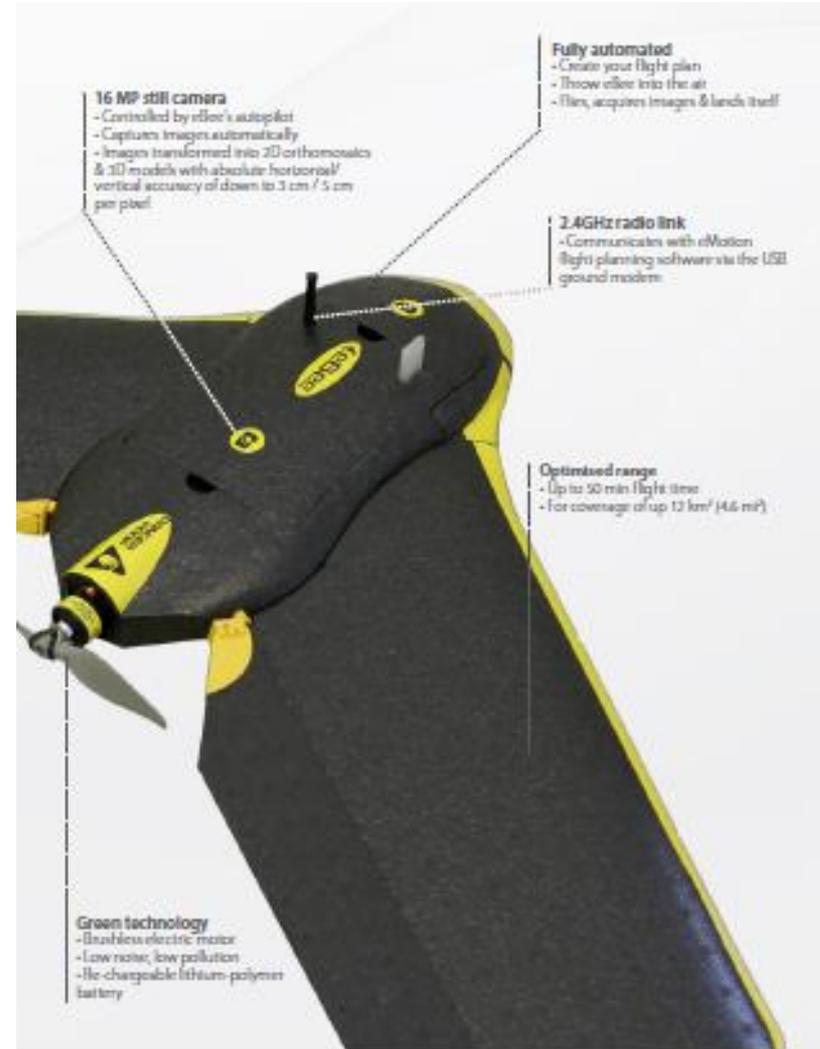
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- We collect geospatial data
  - Using Unmanned Aerial Systems (drones)
- We process that raw data into industry standard formats (.las, .tif, FGDB, .shp, etc.)
- We analyze that data to fit our customers' needs

*Data collection → data analysis*

# Collect

- Weight: 1.52 lbs
- Wingspan: 38 in
- Material: foam, carbon structure & composite parts
- Propulsion: Electric
- Max flight time: 50 min
- Speed: 21+ kts
- Completely autonomous flight



# *Process photos into data*



A screenshot of a GIS software interface. The background is a grid with a red dot in the center. An 'Identify' window is open on the right side. The window title is 'Identify'. It shows 'Identify from:' set to 'elkhorn\_dsm'. Below that, a tree view shows 'elkhorn\_dsm' with a sub-entry '3365.190918'. The 'Location' field shows coordinates '832,548.841 300,003.983 Fe'. A table below lists 'Field' and 'Value' for 'Stretched value' (112) and 'Pixel value' (3365.190918). The bottom of the window says 'Identified 1 feature'.

# *Analysis*

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- Using products derived from processing to understand the spatial world
- Some of what we can do with UAS data:
  - Volumetric analysis
  - Indices
  - Density analysis
  - Change analysis
  - Contouring
  - Classification analysis
  - Digital fly through of terrain
  - Hydrologic modeling and analysis

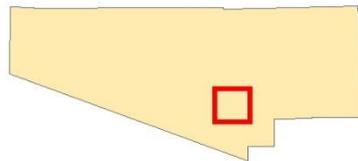
# UAS Mapping

## Hydrologic Analysis

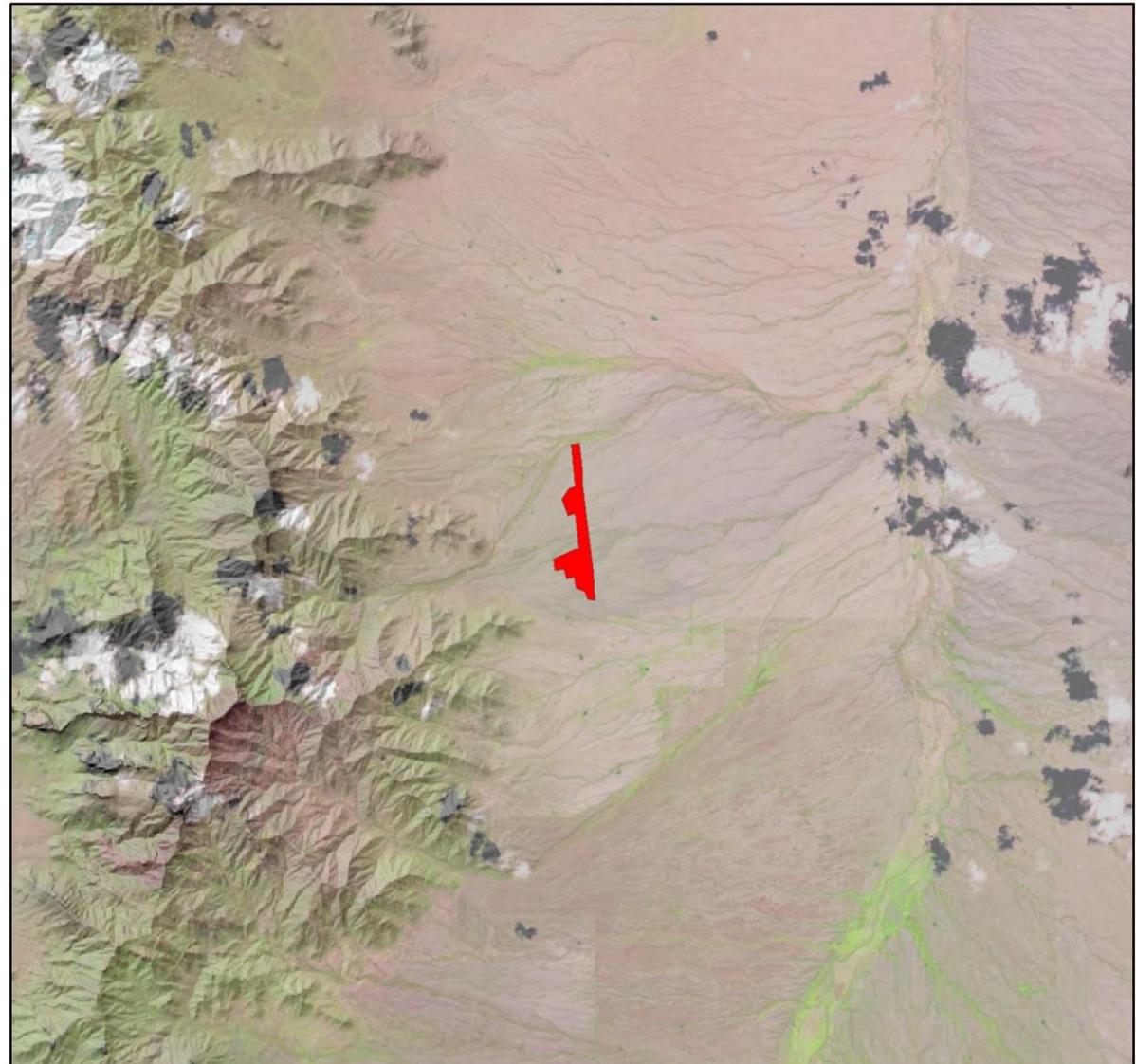
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Sources: US Census, USGS,  
Elkhorn Ranch, Altar Valley  
Conservation Alliance

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0 90 Mi



0 3 Miles  
1:150,000



Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

*Develop a map that shows stream flow as well as erosion mitigation efforts*



0 10  
Feet

# *Collection*

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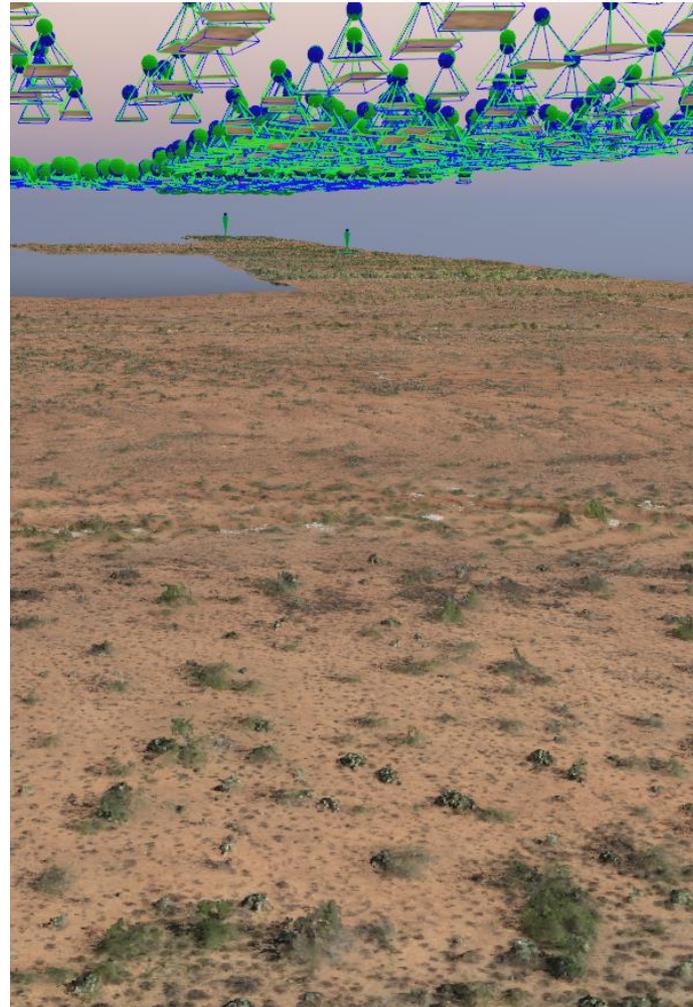
- Project area is in the Altar Valley in southern Pima county
- Sensor used was a 12mp RGB with 8 bit radiometric resolution
- Geometric resolution = 1.5 inch
- Acres covered: 385



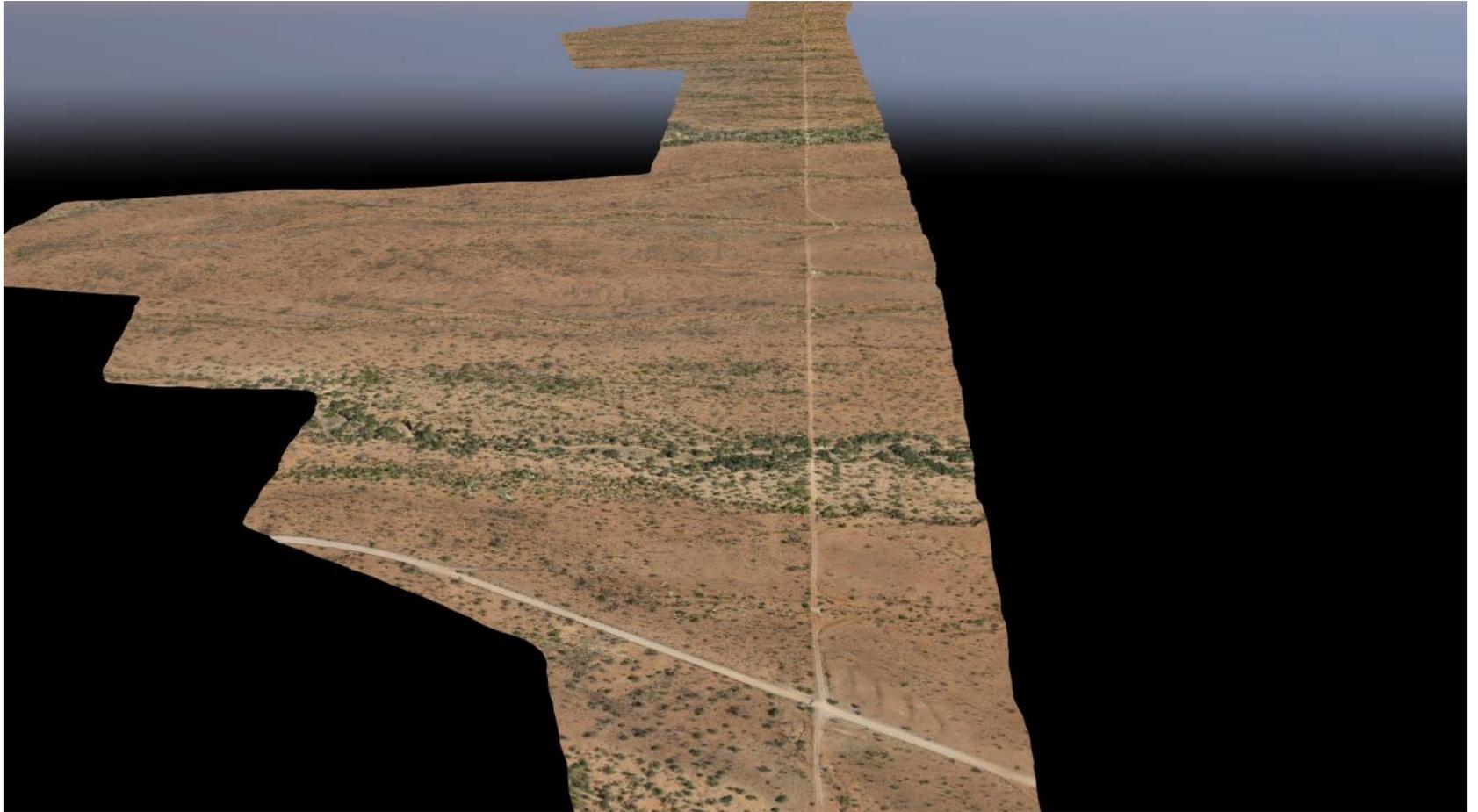
Thanks to: Elkhorn Ranch, Altar Valley Conservation Alliance, Pima County NRPR

# *Processing*

- 1,256 aerial images taken
- Processed into all three dimensions
- Ground reference points were taken from Pima Maps and Google API (elevation)
- Results: orthomosaic, a Digital Surface Model (elevation), and a point cloud



# *Point Cloud fly by*



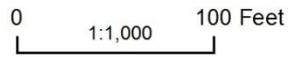
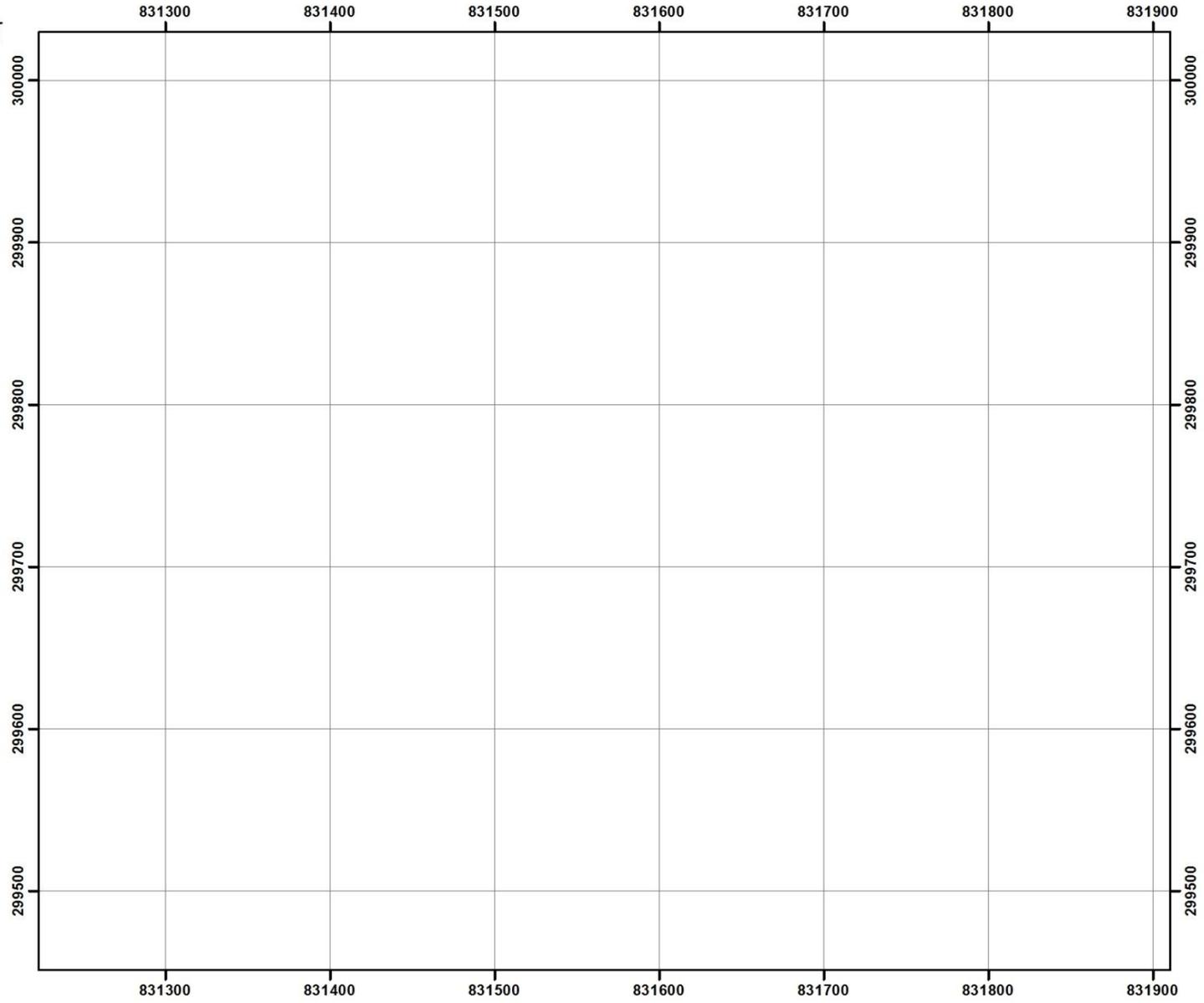
# *Analysis*

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- Orthomosaic
- Digital Surface Model
- Hillshade
- Contours
- Streamline determination
- Stream ordering
- Feature classification
- Watershed determination
- Stream profiles
- Elevations along the wash

*UAS Mapping*  
*Restoration*  
*Project*

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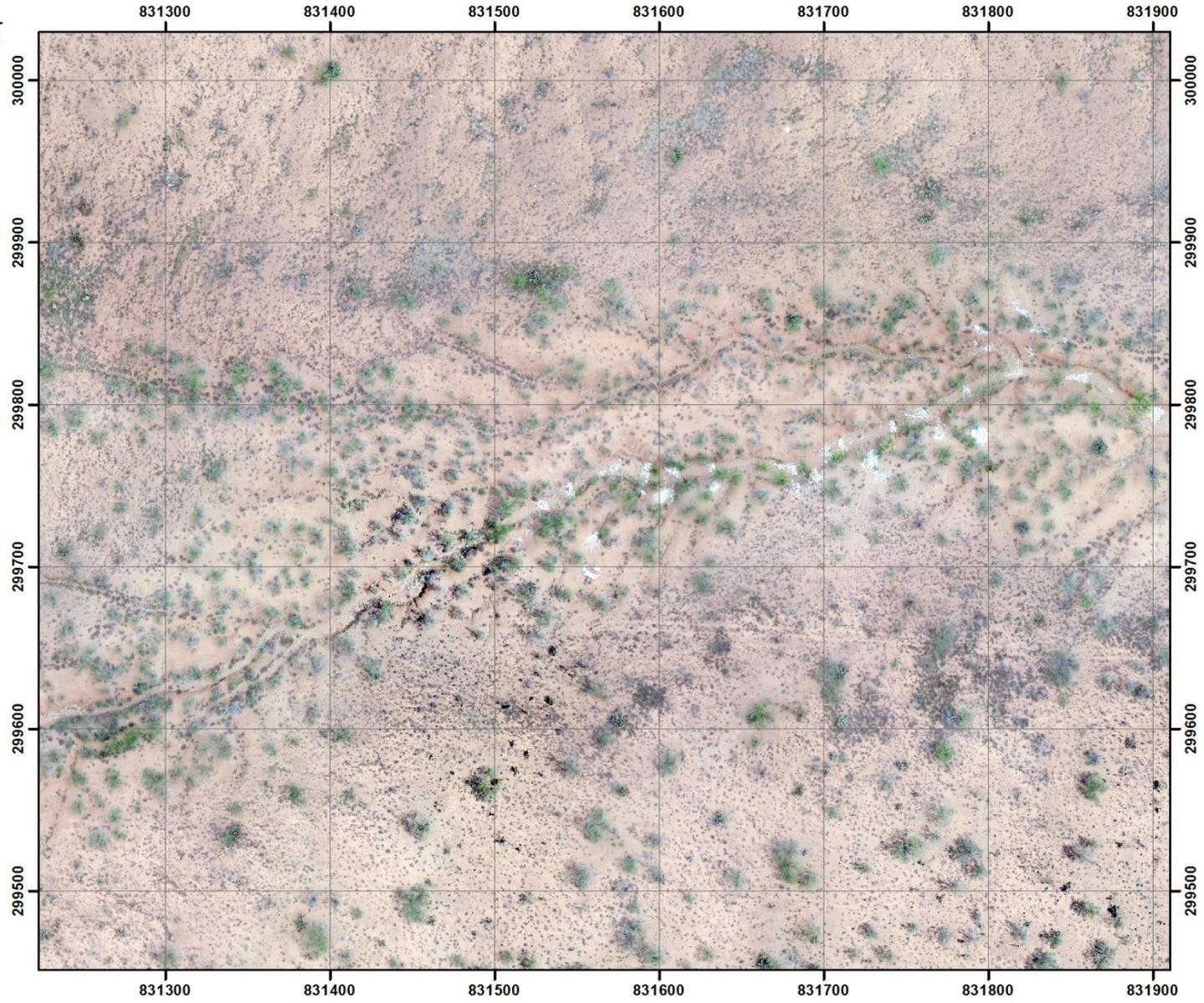


Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Orthomosaic

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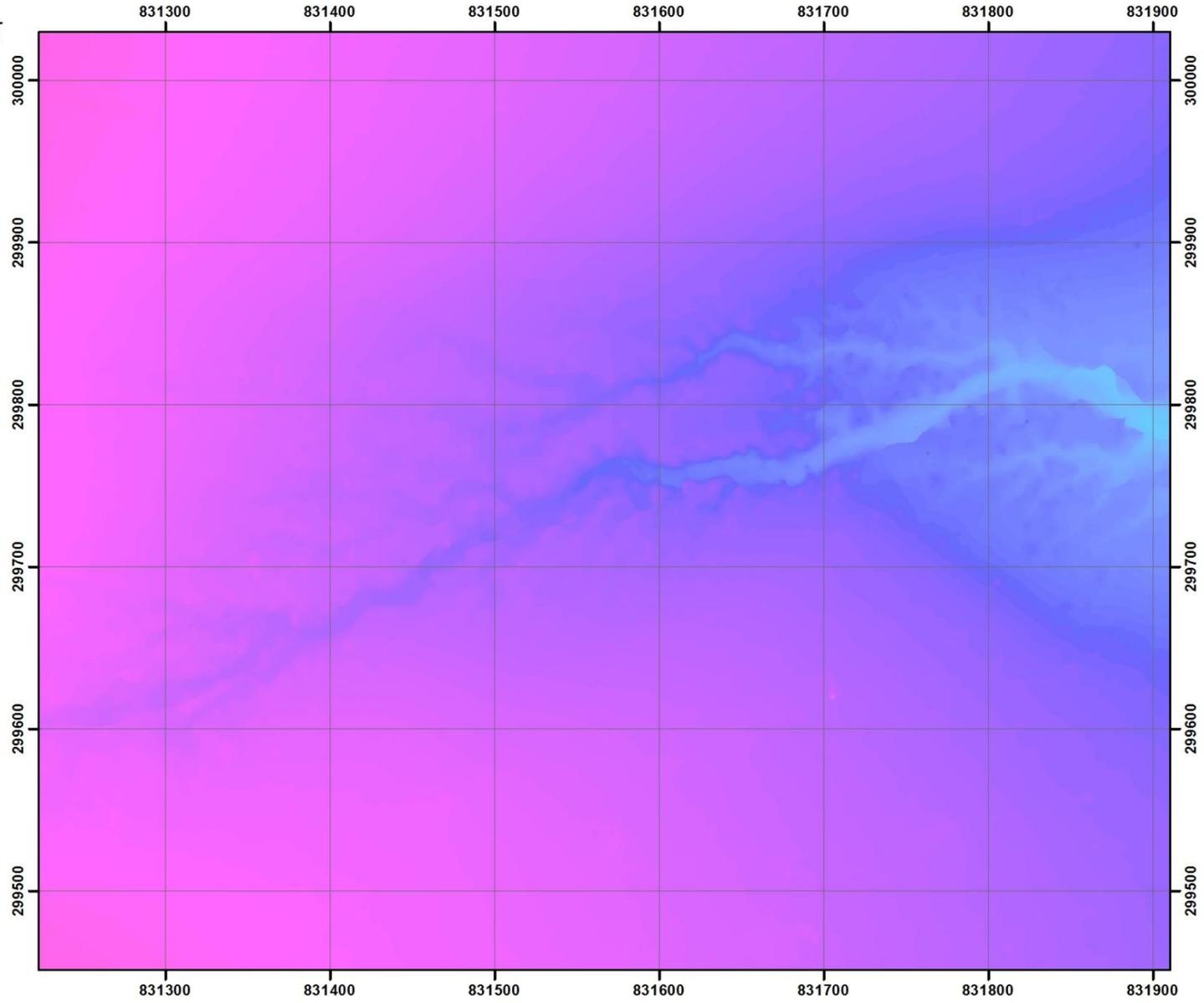


Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Digital Surface Model

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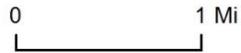
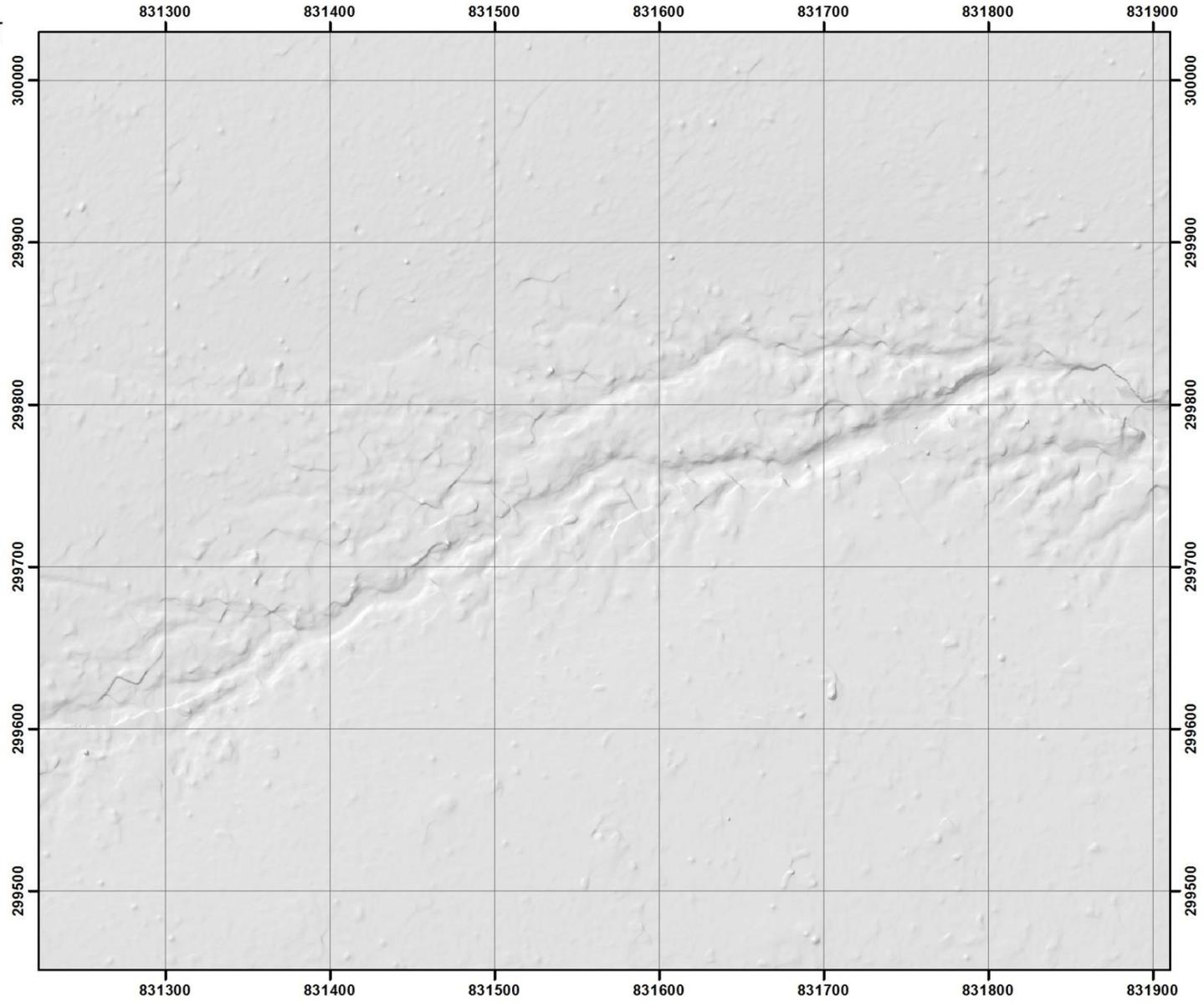


Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Hillshade

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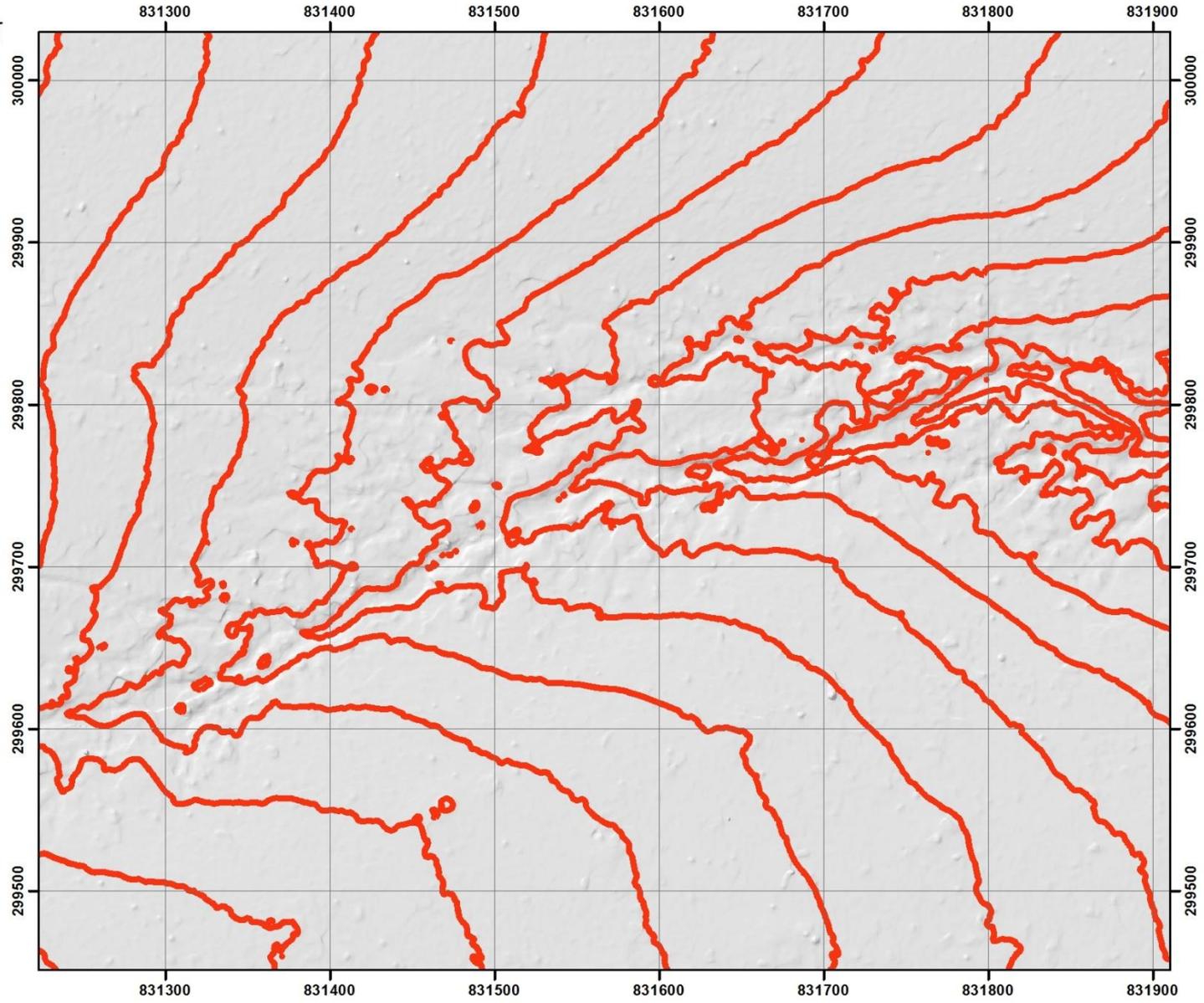
Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Ugly Contours

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— 2 ft contour



0 1 Mi

0 100 Feet  
1:1,000



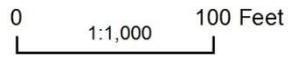
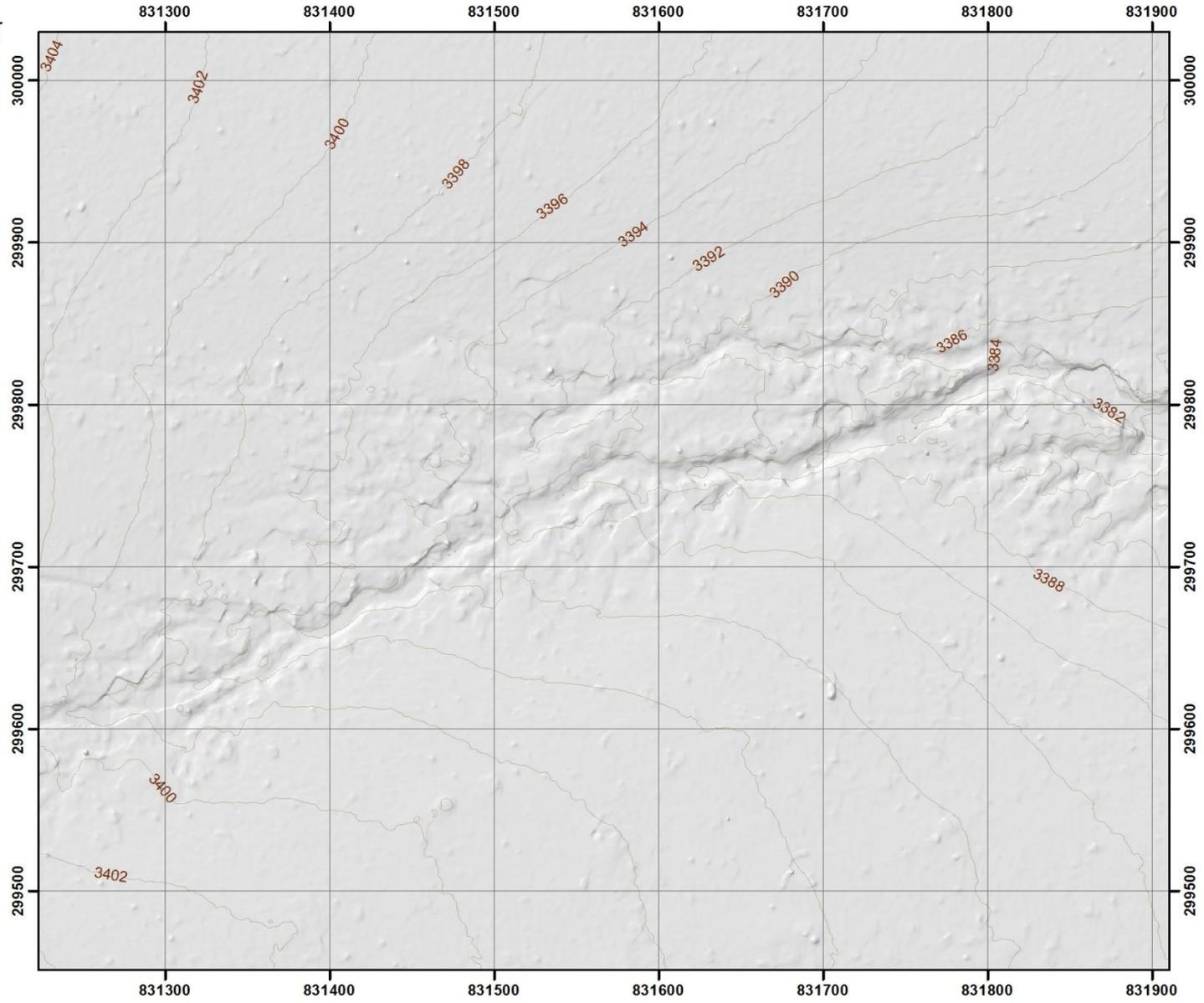
Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Contours

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— 2 ft contour



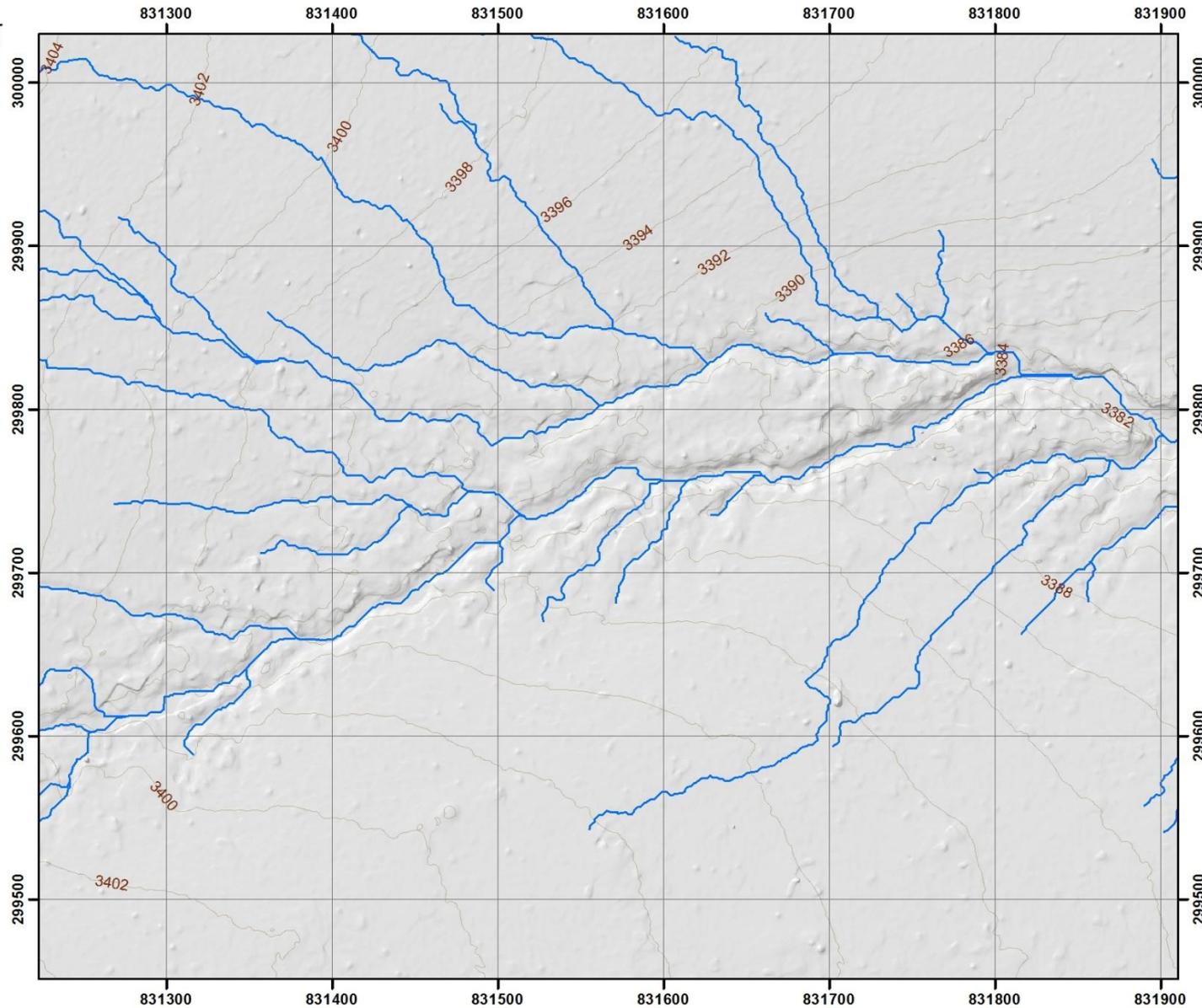
Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Streamlines

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— Streamlines  
— 2 ft contour



0 1 Mi

0 100 Feet  
1:1,000



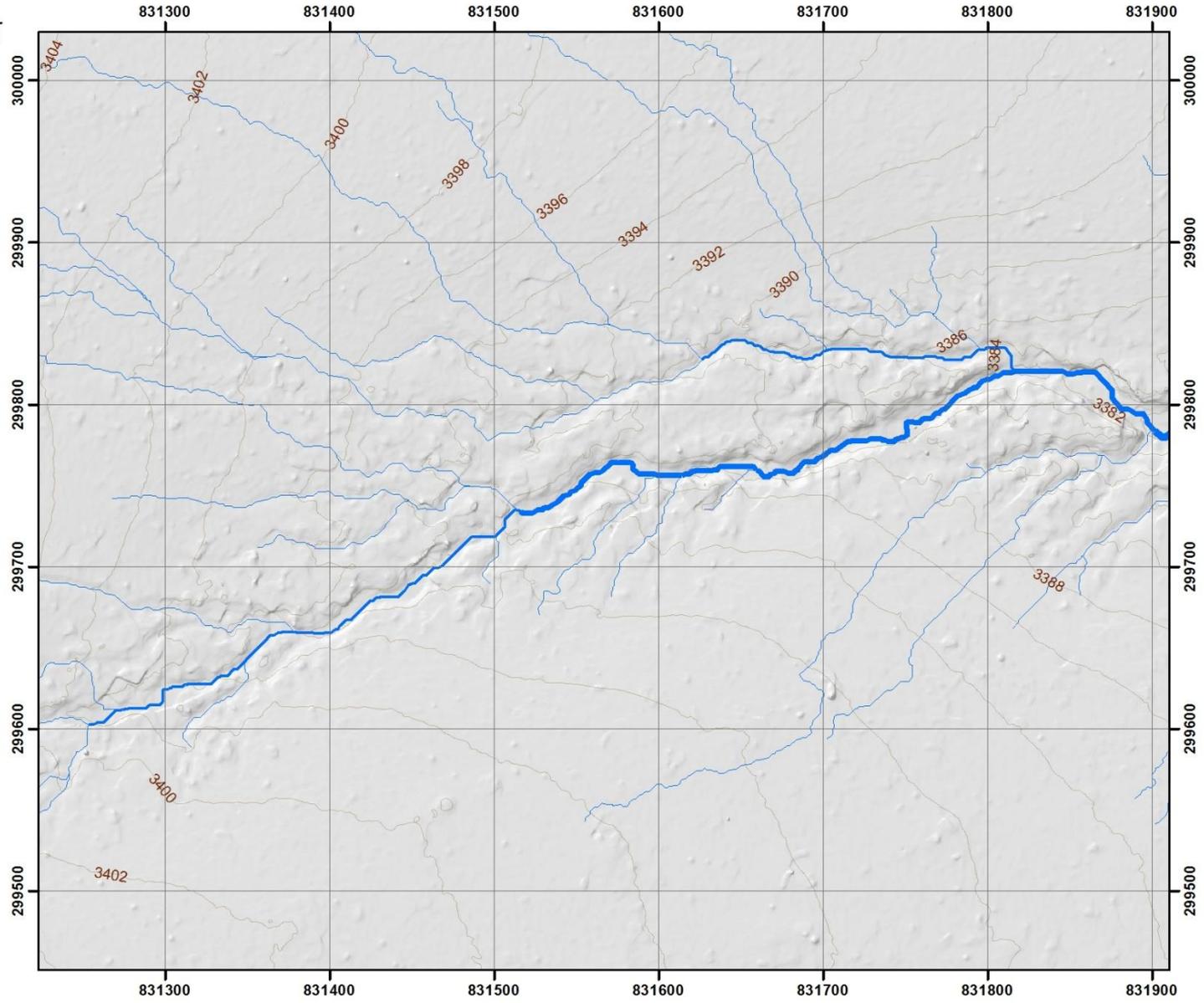
Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Stream Ordering

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- 2 ft contour
- 1 - 8 Shreve #
- 9 - 21
- 22 - 39
- 40 - 64



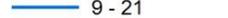
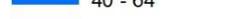
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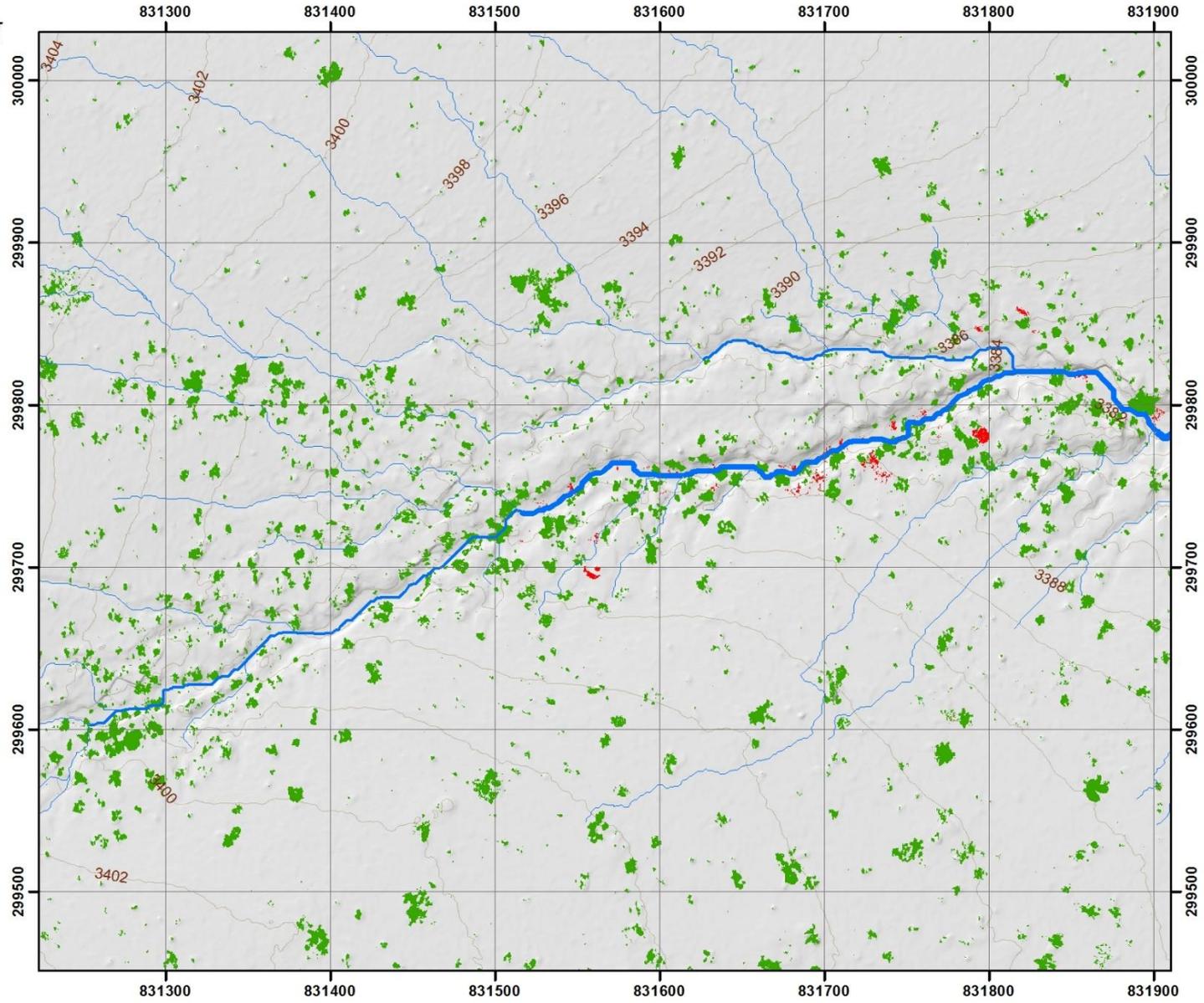
# Trees and mitigation works

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-  2 ft contour
-  1 - 8 Shreve #
-  9 - 21
-  22 - 39
-  40 - 64
-  Trees
-  Rock works



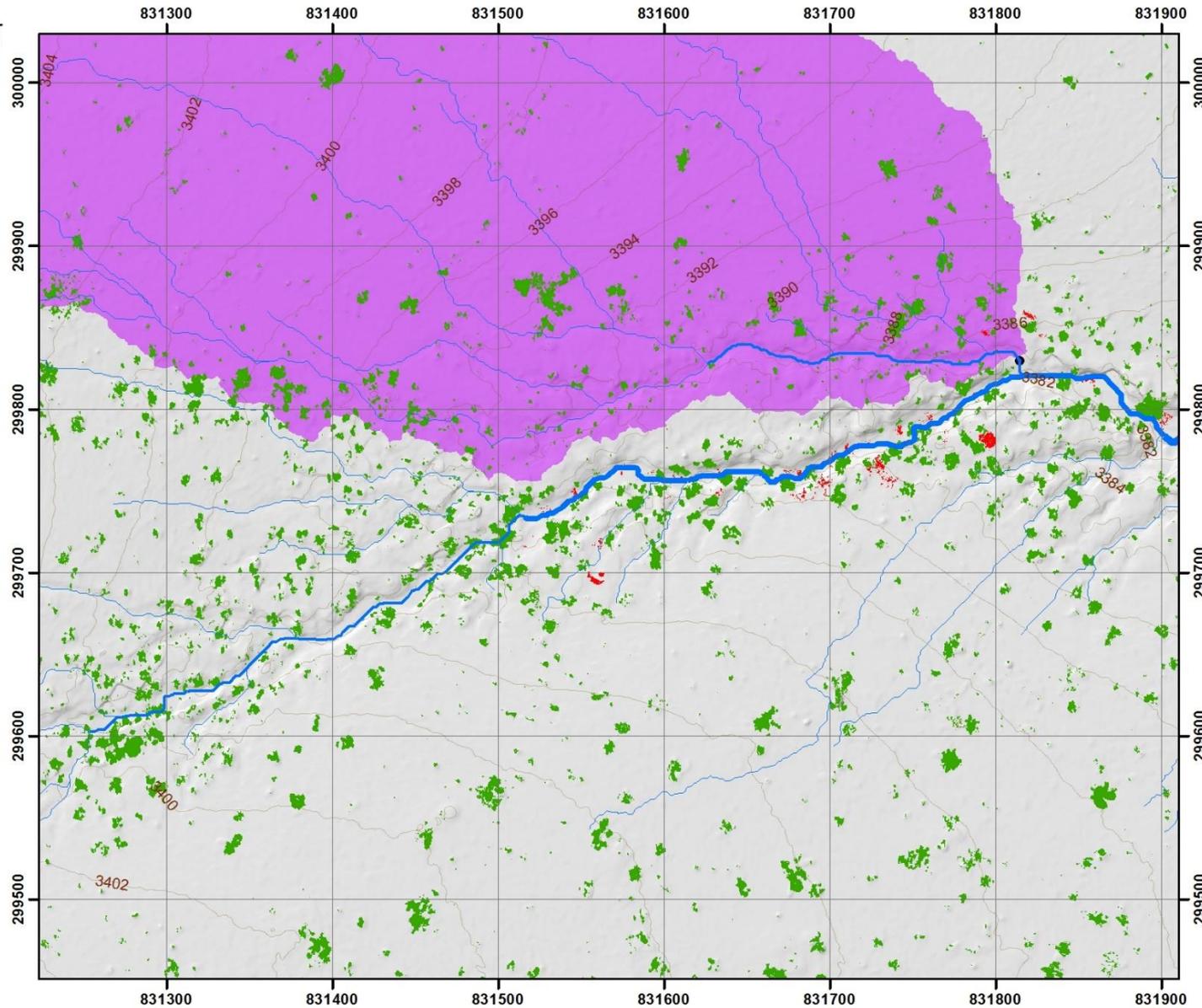
Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# Watershed

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- 2 ft contour
- 1 - 8 Shreve #
- 9 - 21
- 22 - 39
- 40 - 64
- Trees
- Rock works
- Pour point
- Northern branch watershed

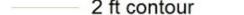
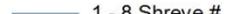


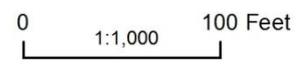
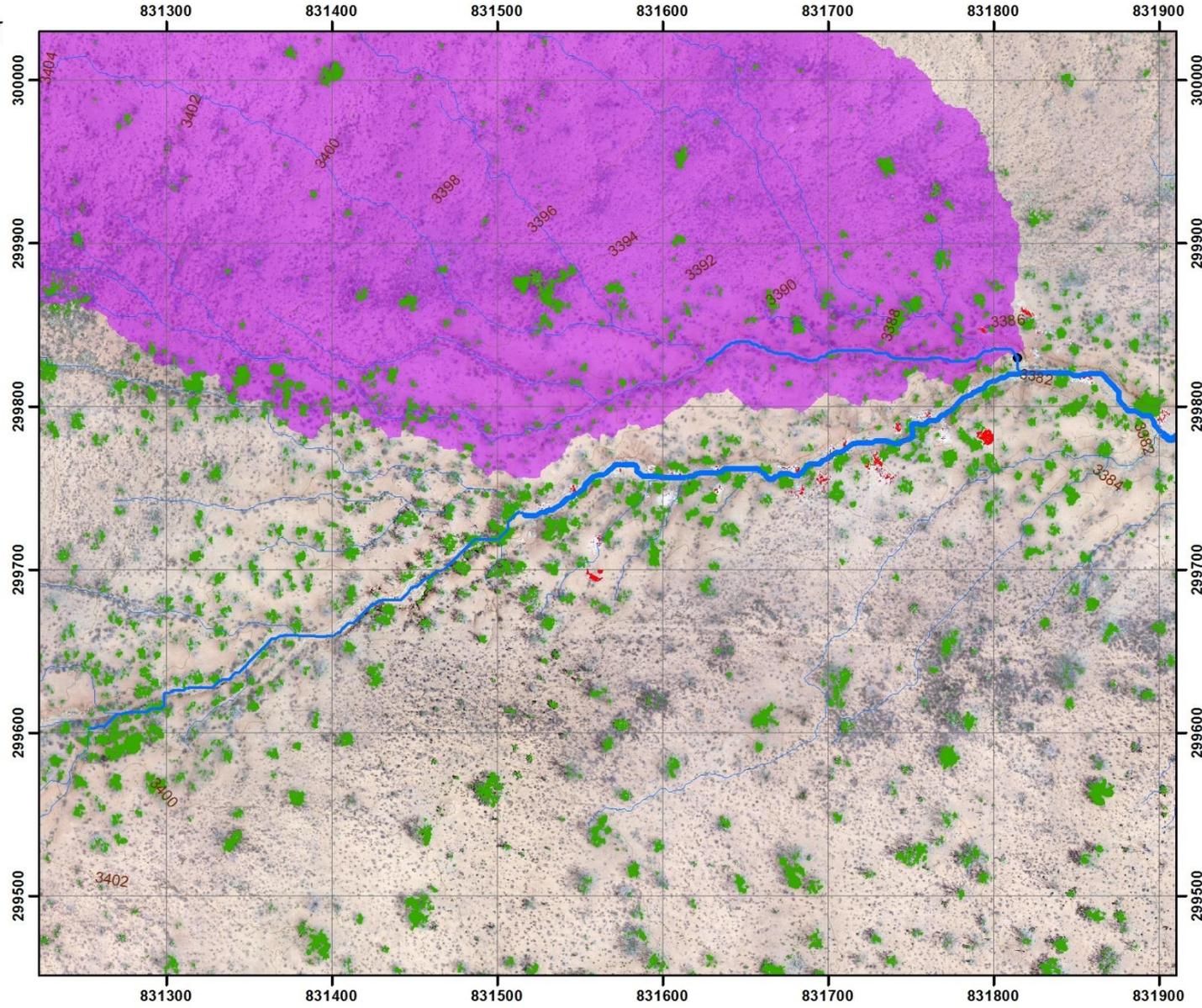
Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

# All together

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-  2 ft contour
-  1 - 8 Shreve #
-  9 - 21
-  22 - 39
-  40 - 64
-  Trees
-  Rock works
-  Pour point
-  Northern branch watershed

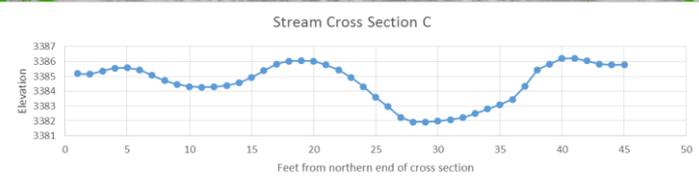
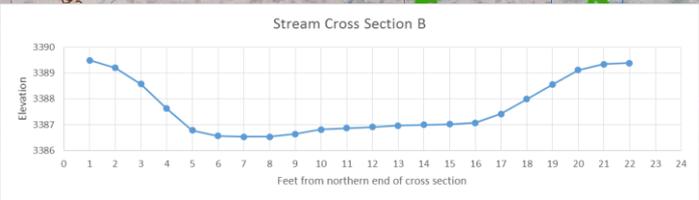
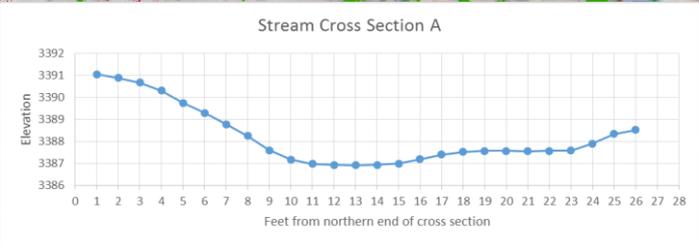
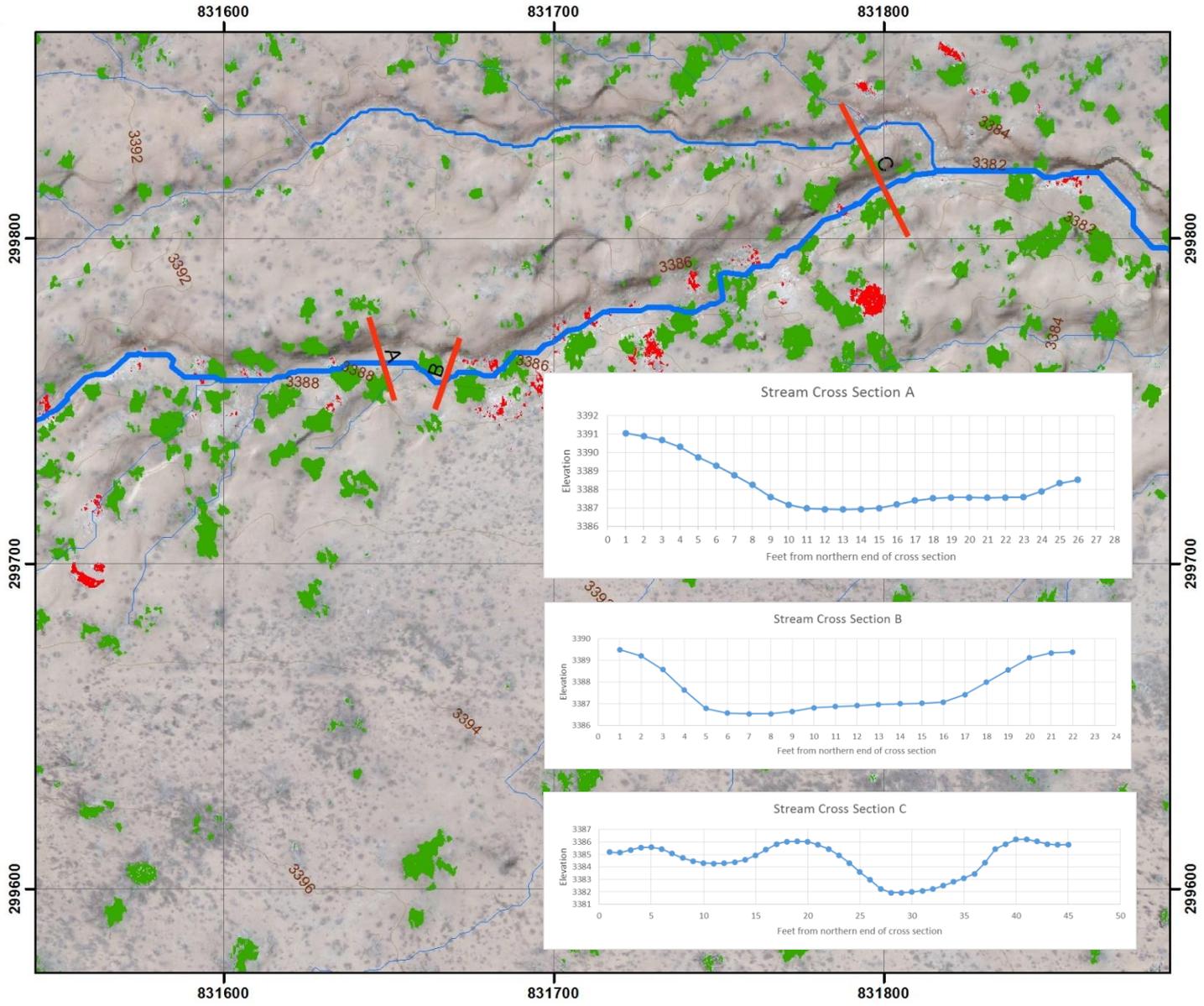


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Projection: Transverse Mercator  
Datum: North American 1983

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-  Cross sections
-  2 ft contour
-  1 - 8 Shreve #
-  9 - 21
-  22 - 39
-  Trees
-  Rock works



Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
Projection: Transverse Mercator  
Datum: North American 1983

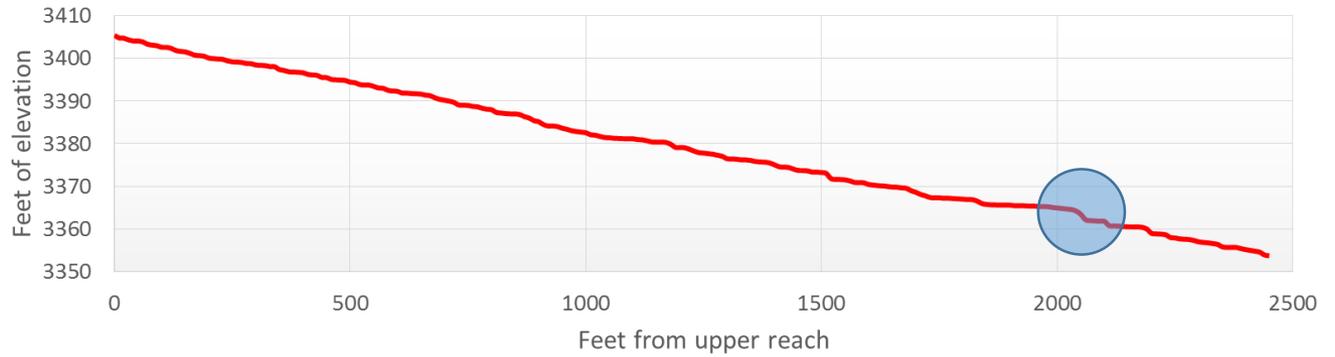
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 MainStreamLine  
 2 ft contour

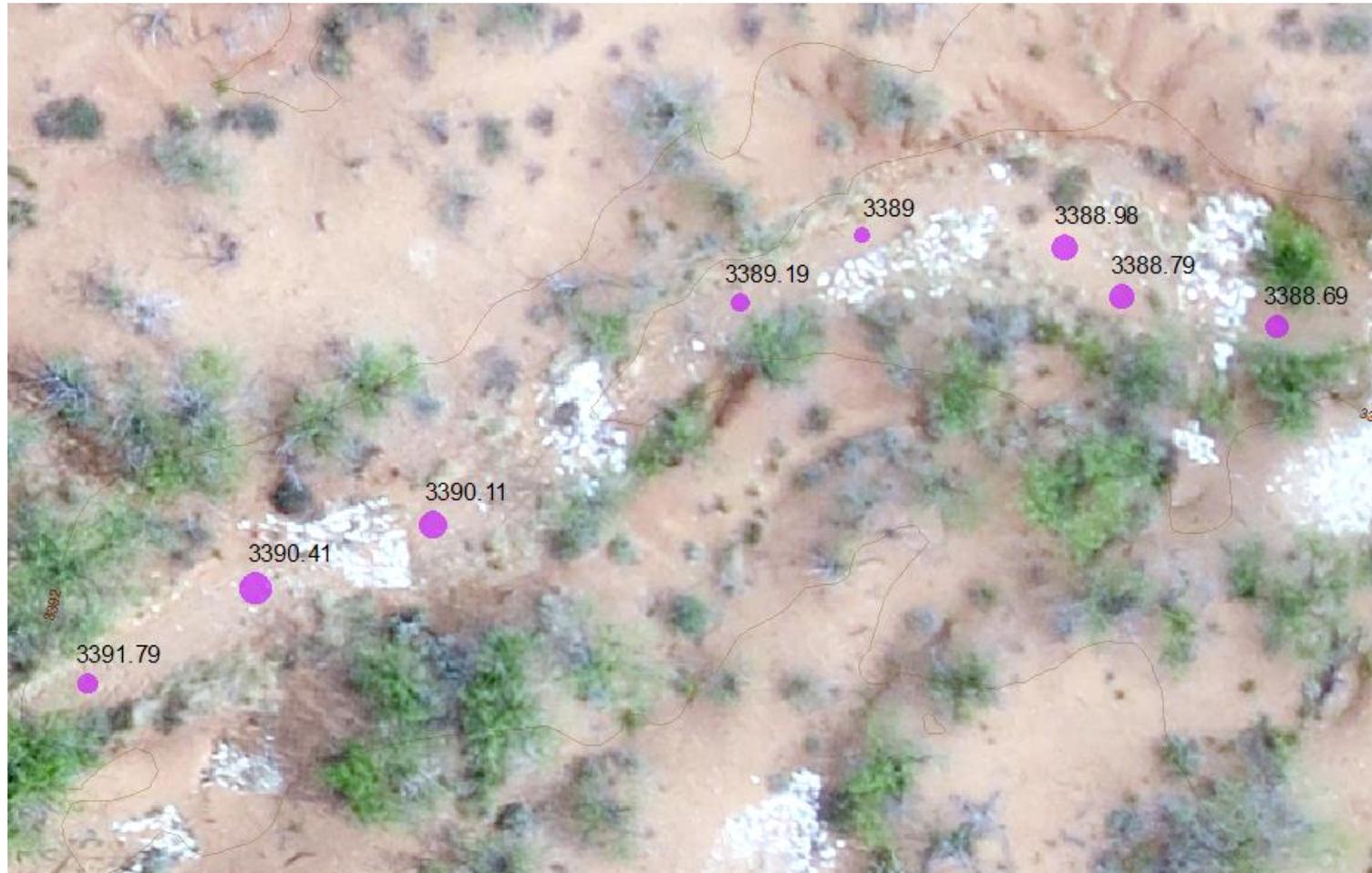


Main channel profile (10X exaggeration)



Coordinate System: NAD 1983 StatePlane Arizona Central FIPS 0202 Feet  
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# *Elevations along the stream*



0 10  
Feet

# *Agenda*

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- Who we are
- What we do
- Collect
- Process
- Analyze
- Example: Hydrologic Modeling / Analysis
- Questions

