Creating Bathymetric Data of Standley Lake, Colorado

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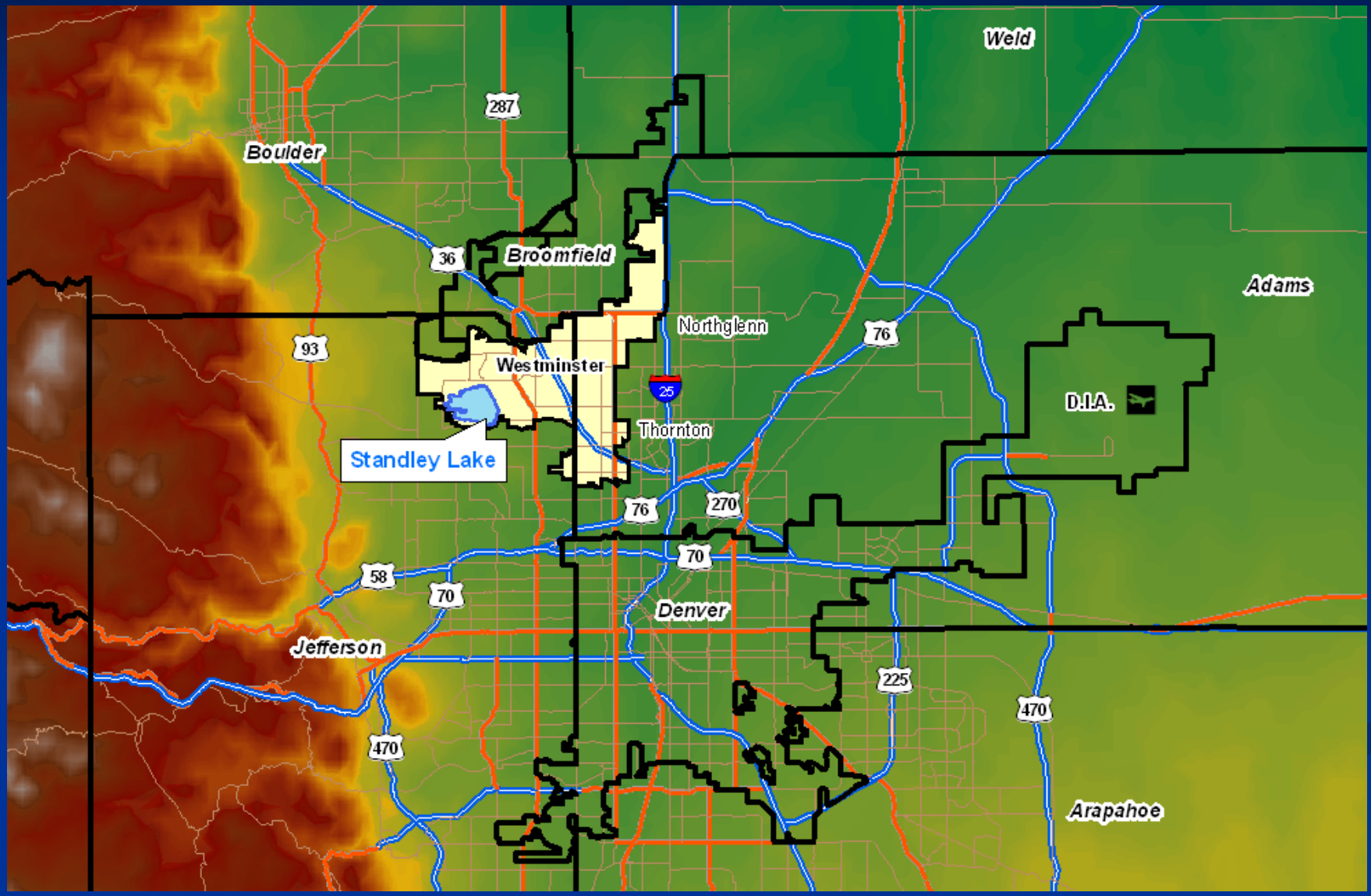
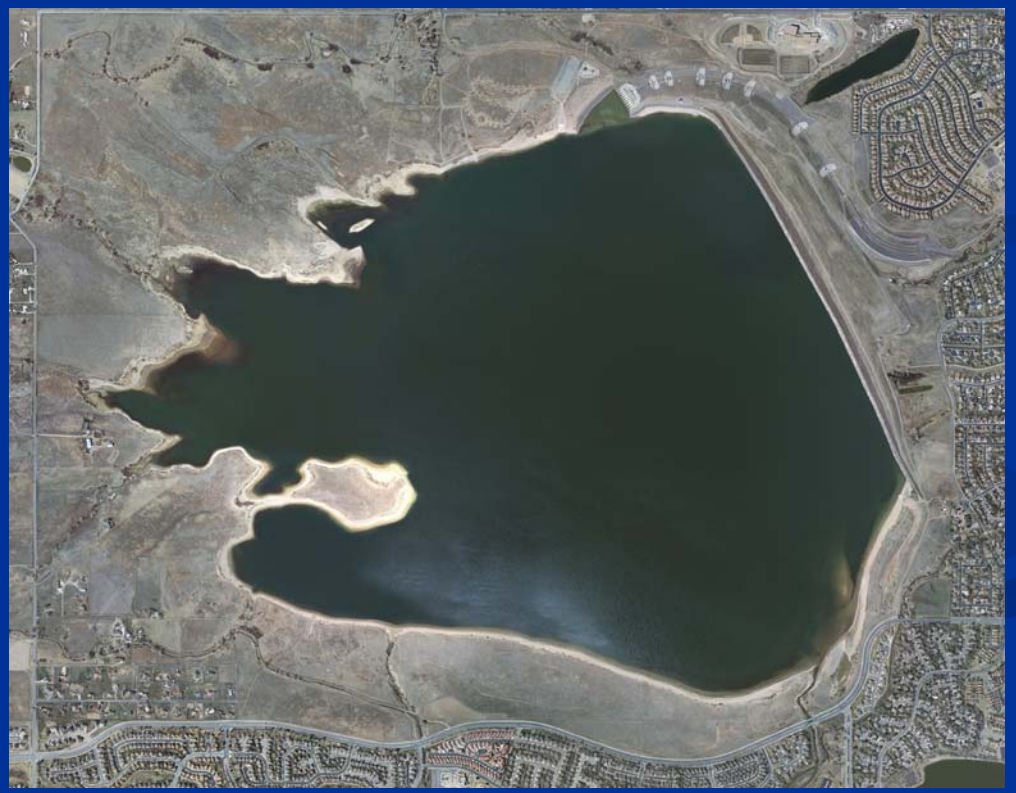
Standley Lake, Colorado



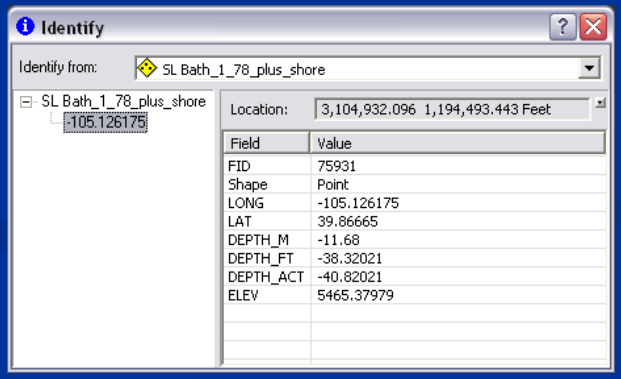
Standley Lake

- Serves over 250,000 people in three cities
- Contains 42,000 acre feet at capacity
  - (13B gallons)
- 1200 acres
- Deepest point:
  - 80 feet



Acquiring point data

- BioSonics sonar echosounder
  - Each point linked to a GPS Lat/Long position
    - Resulting X/Y/depth points



Creating points in GIS

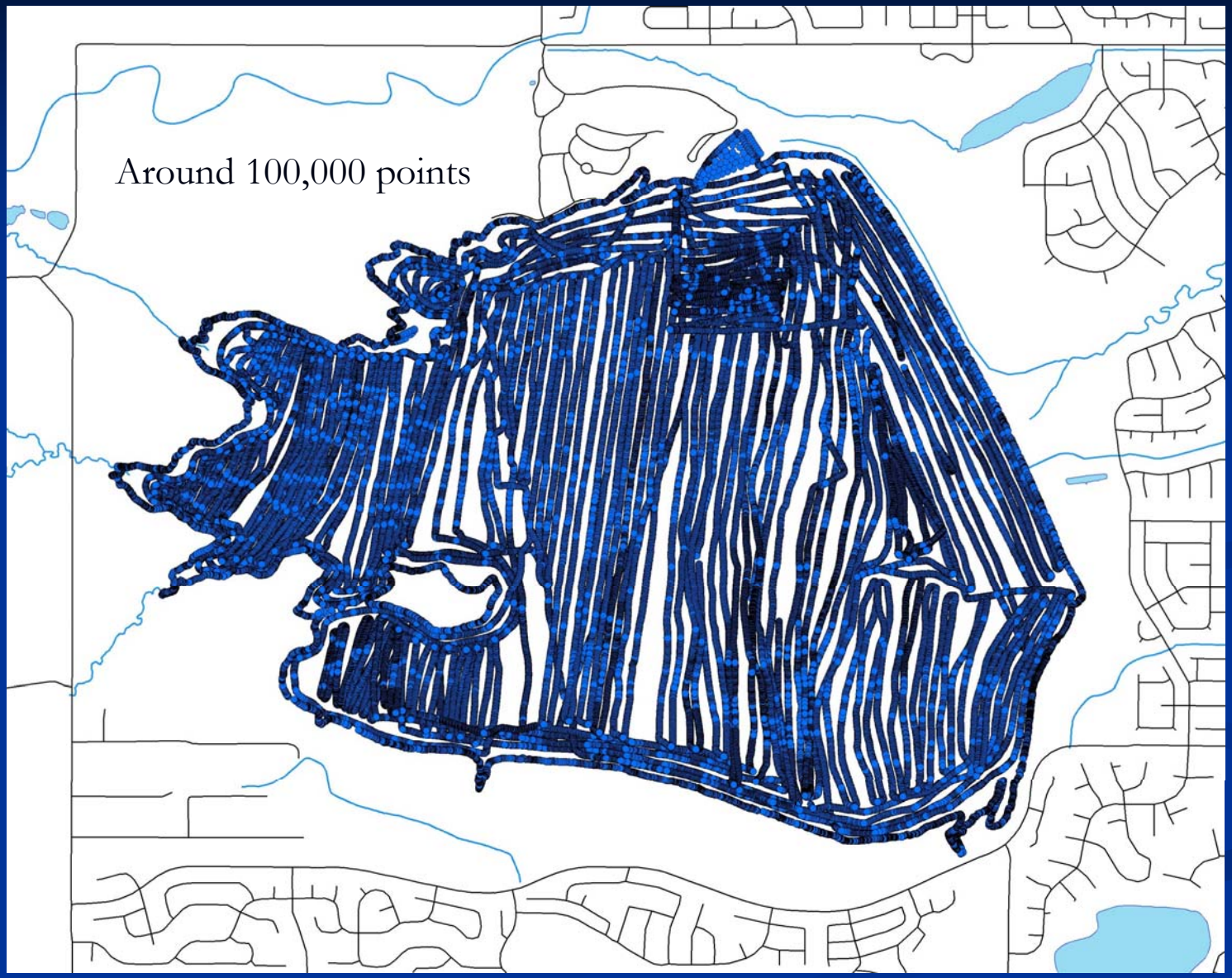
- Download raw data
- Data prepping in Excel – Lat/Long to Decimal Degrees
  - Create depth field
- Import to GIS
  - "Add XY data"

	A	B	C	D	E	F	G	H
1	FILE_# 20	N2	N3	N4	N5	N6	N7	
2	Date: 9/2			Lake gage height:	90.4530000000	Surface Elevati	5500.6530000000	
3	Time:	14:40-15:10		Depth offset	5.5470000000			
4		Latitu	Lon	Measured Depth (m		Actual depth (f		
5		39.8580616667	-105.1376716667	2.73	8.9566929270	14.5036929270	5491.6963070730	
6		39.8580666667	-105.1376766667	2.73	8.9566929270	14.5036929270	5491.6963070730	
7		39.8580666667	-105.1376766667	2.73	8.9566929270	14.5036929270	5491.6963070730	
8		39.8580666667	-105.1376766667	2.73	8.9566929270	14.5036929270	5491.6963070730	
9		39.8580666667	-105.1376766667	2.73	8.9566929270	14.5036929270	5491.6963070730	

Some problems:

- Lots of data prep work in Excel
  - Many duplicate points - must be removed
  - Must adjust Lat/Long to Decimal Degrees
    - GPS data exported as degrees, minutes, seconds
  - Projection must be correct
    - Import to WGS 84 and Project to local projection (State Plane, etc.)
  - Create "actual depth" measurement
    - Based on depth from lake elevation at full capacity

Resulting data points

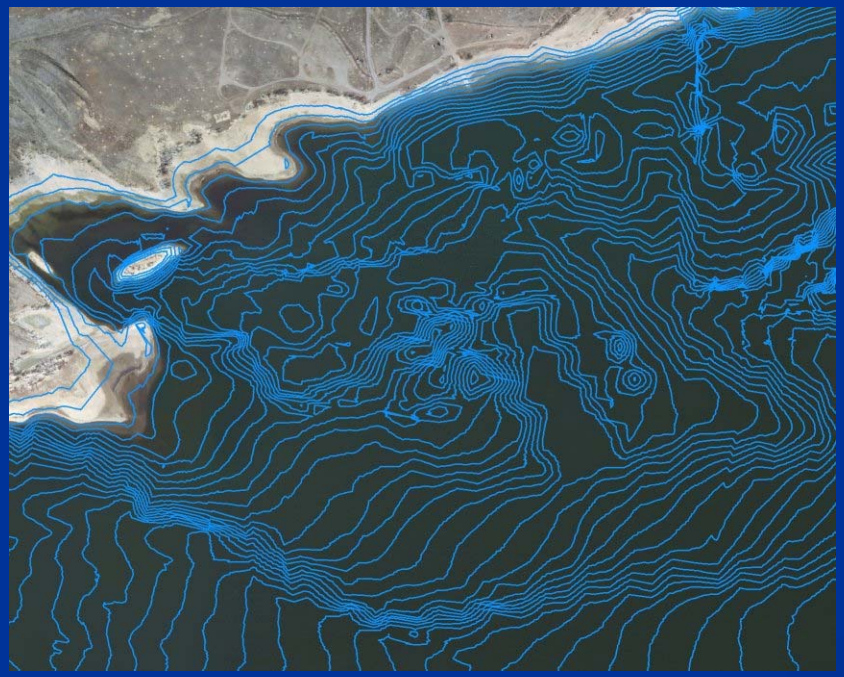


With "fake" shore points at full-lake elevation (5506 ft)

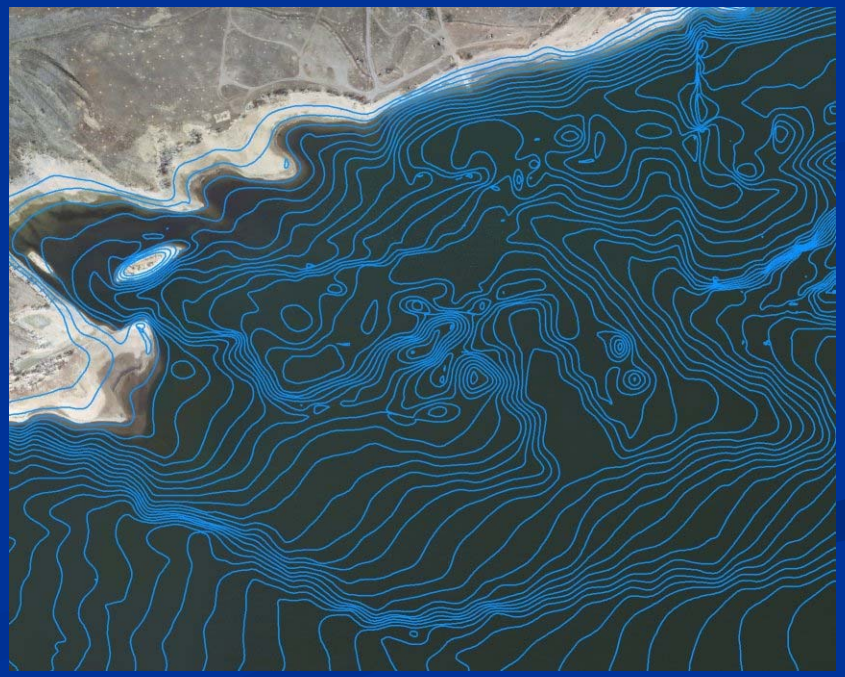
Creating topography lines

- 3D analyst:
  - Points to contour lines
  - Very jagged initially – probably more accurate after smoothing

Original

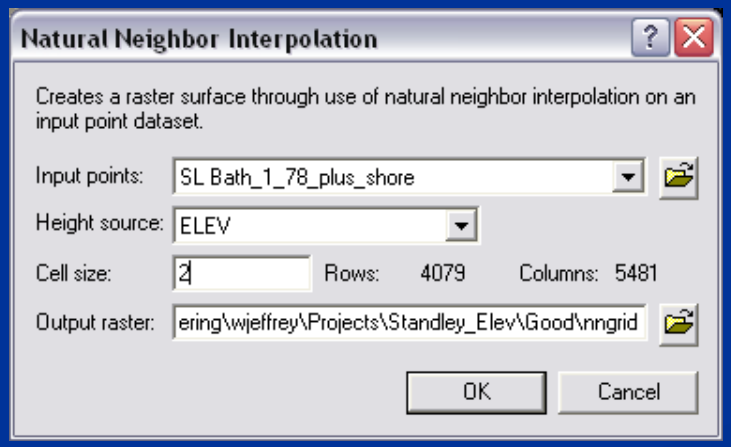


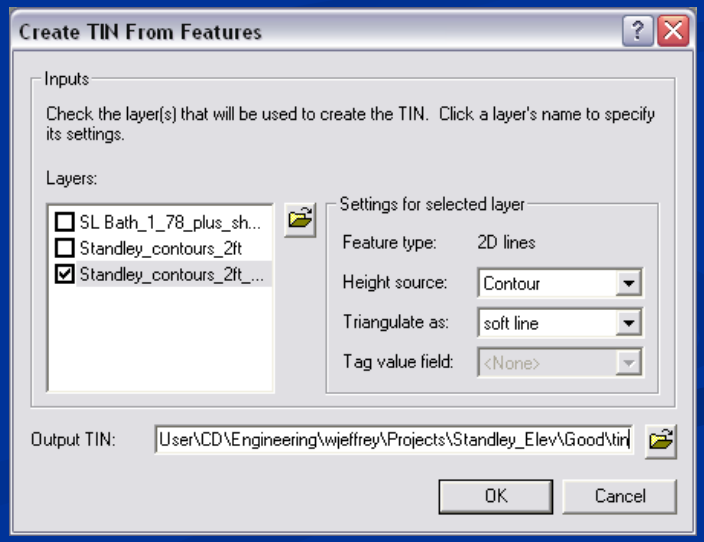
Smoothed



Creating Terrain data in 3D Analyst

- Contours to DEM GRID – raster elevation data
- Contours to TIN – Triangulated Irregular Network
- Terrain data
  - Multiple data sources, pyramids, automatic updating

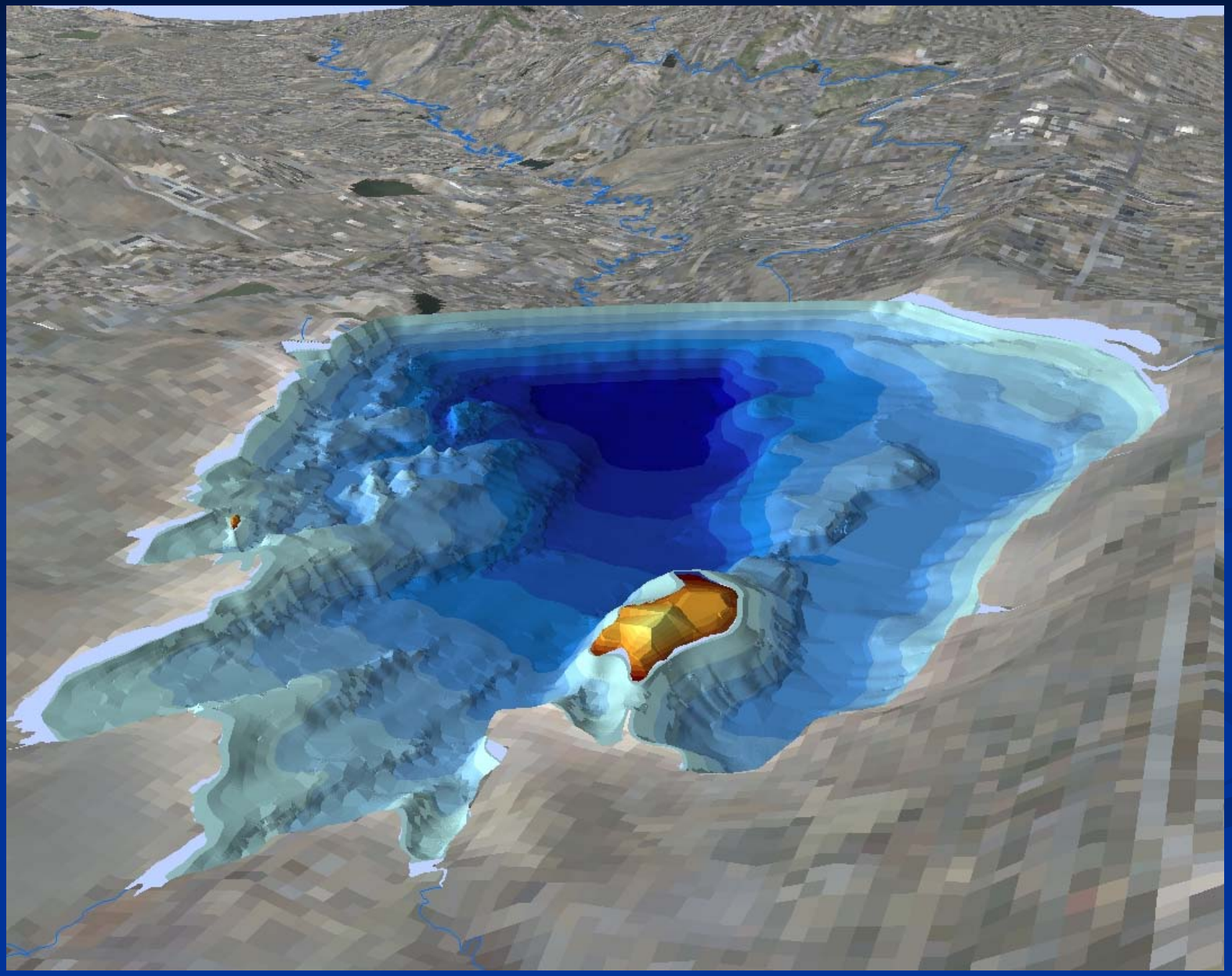




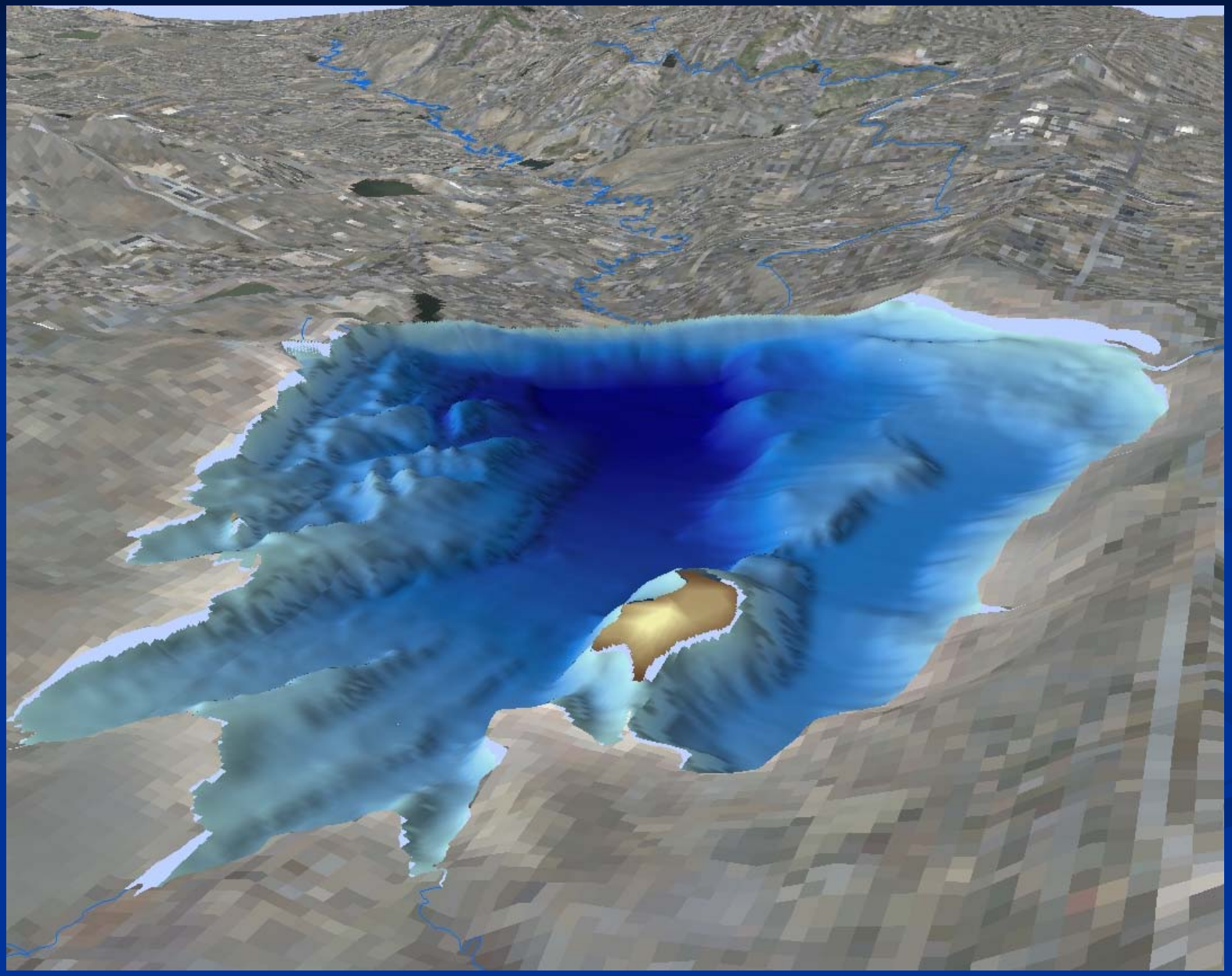
Working with the data

- Clipping the rasters
  - No raster clip tool!
    - Use mask setting in conversion tools instead
- Python script to repeat the process:
  - From table to points to DEM elevation
  - Many small sections of the lake made during testing
  - Redo sections over time for invasive plant tracking
- Now used to approximate total water amount and compare to earlier estimates to determine infill rates

Terrain in ArcScene (elevation exaggerated)

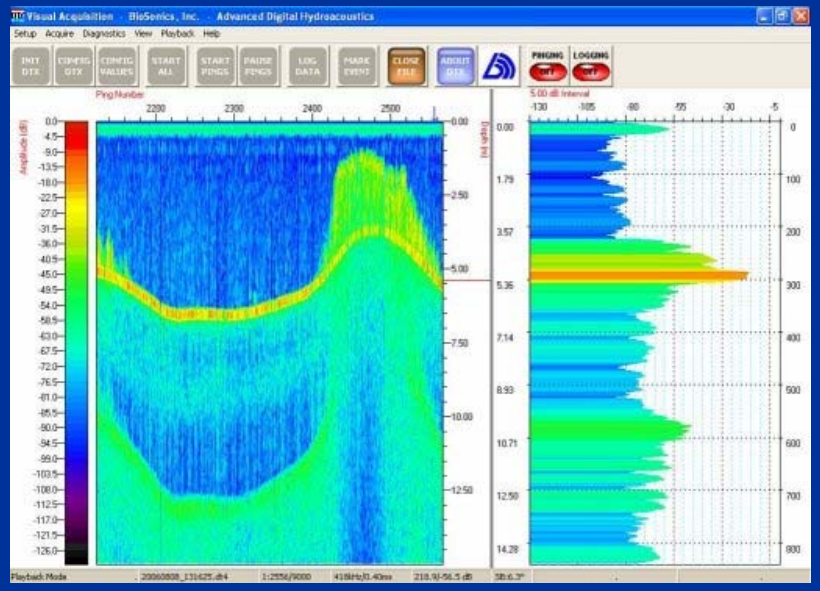


DEM GRID in ArcScene (elevation exaggerated)



Finding plants

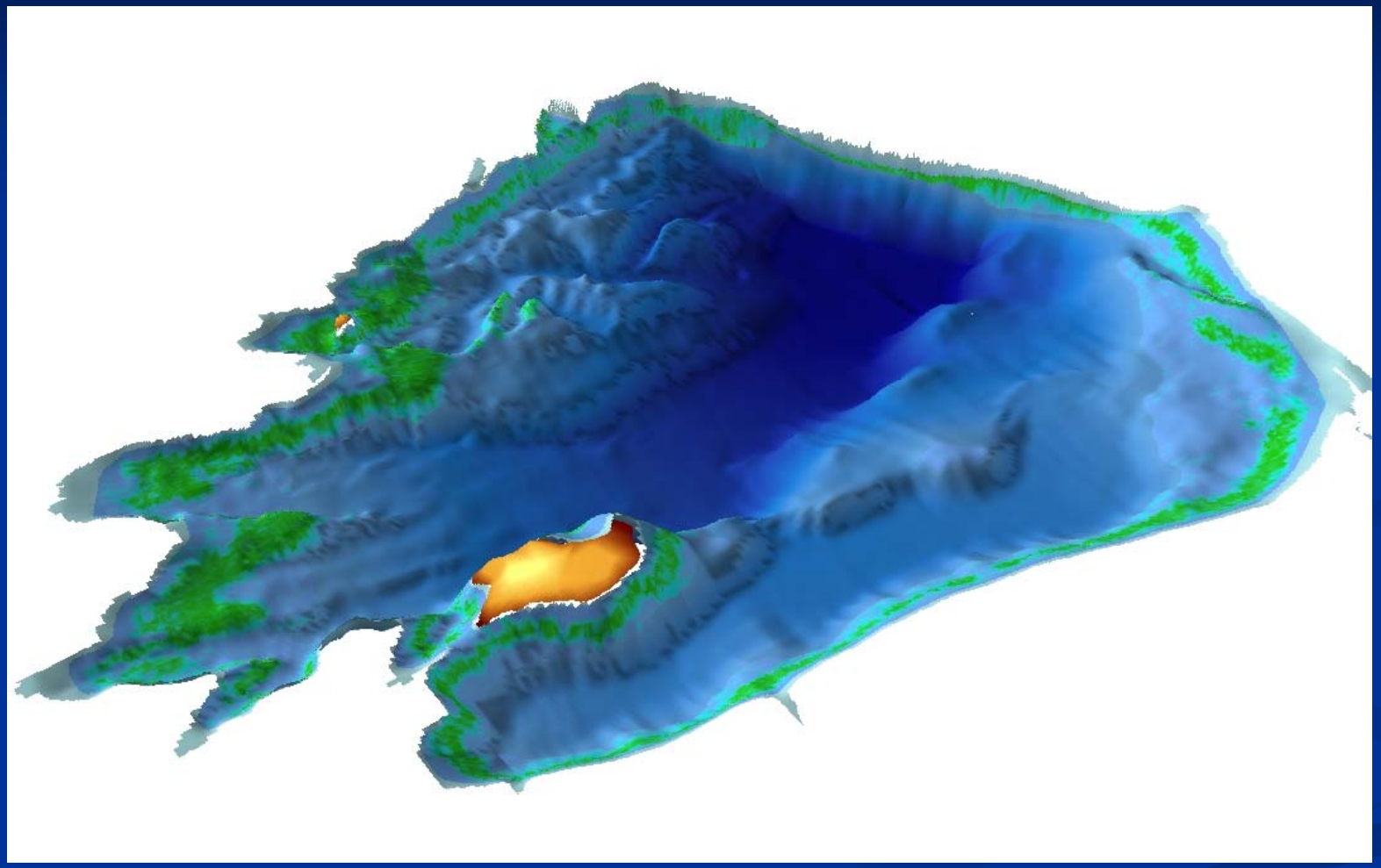
- Bio Sonics EcoSAV (Submerged Aquatic Vegetation) software
  - Multiple pings to recognize plant canopy
  - Echo signal strength analyzed to find plant heights
  - Used to create plant coverage % data



Plant data is clipped to 20 ft depth or less

Used to target the invasive Eurasian Water Milfoil with circulators, harvesting efforts and milfoil-eating weevils

Plant data over DEM GRID



Plant coverage % used to classify raster

Questions?

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