Floodplain deposition modeling on Trout Creek:

Quantifying the sequestration of fine sediment

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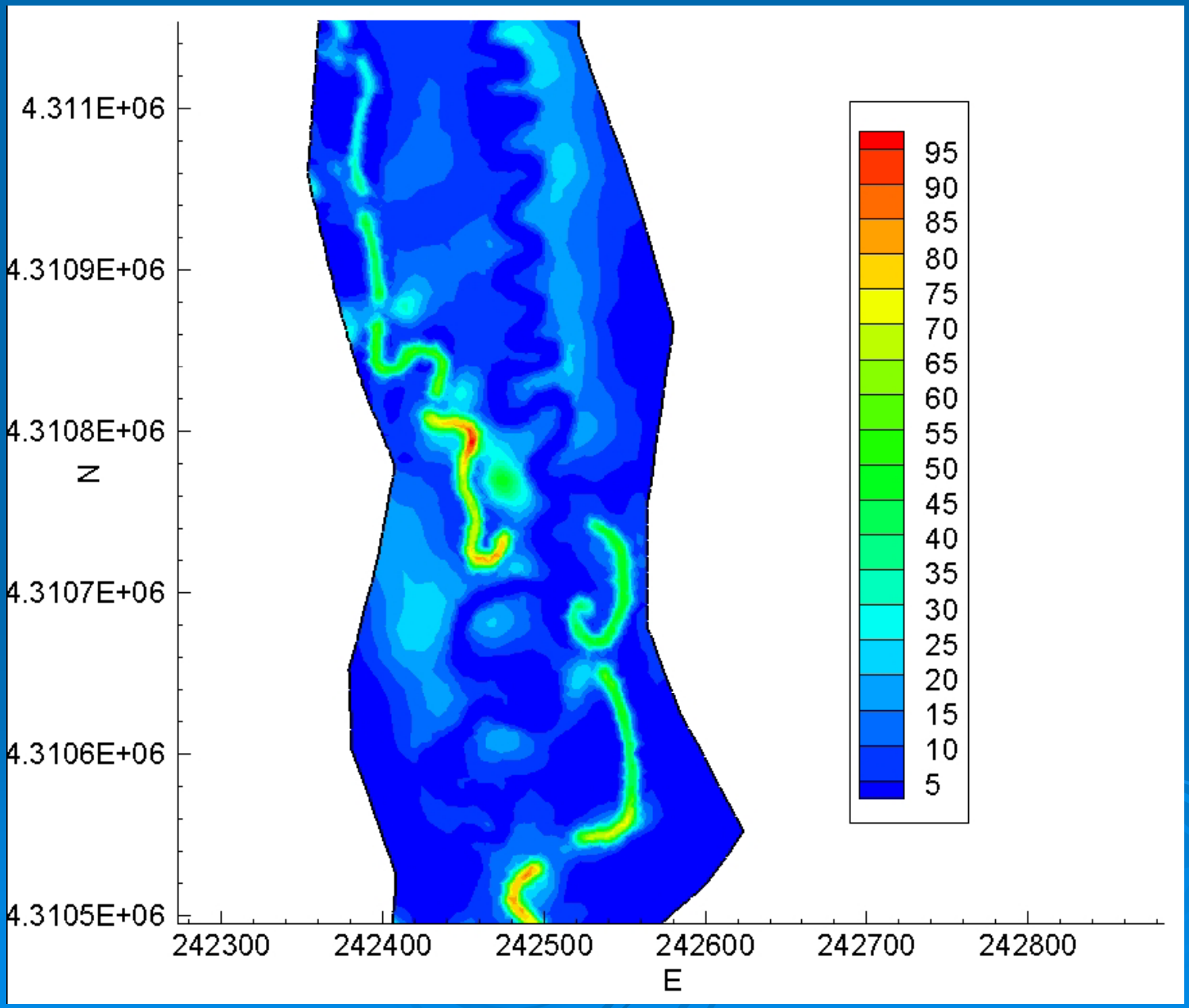
Overview

- About 45% of fine sediment discharge from Trout Creek occurs during times of flooding
- If we could modify the floodplain, how would we do it to maximize fine sediment removal?
- Model needs
  - Monitoring data
  - Input files
  - Constraints and assumptions

2D Hydrodynamic and Water Quality Model

- Input files
  - Grid files
  - Topography and vegetation height data
  - Boundary conditions – flow in/out, suspended sediment in
  - Meteorological data
- Output
  - Water depths and velocities
  - Suspended sediment deposition and removal efficiency

Deposition Map



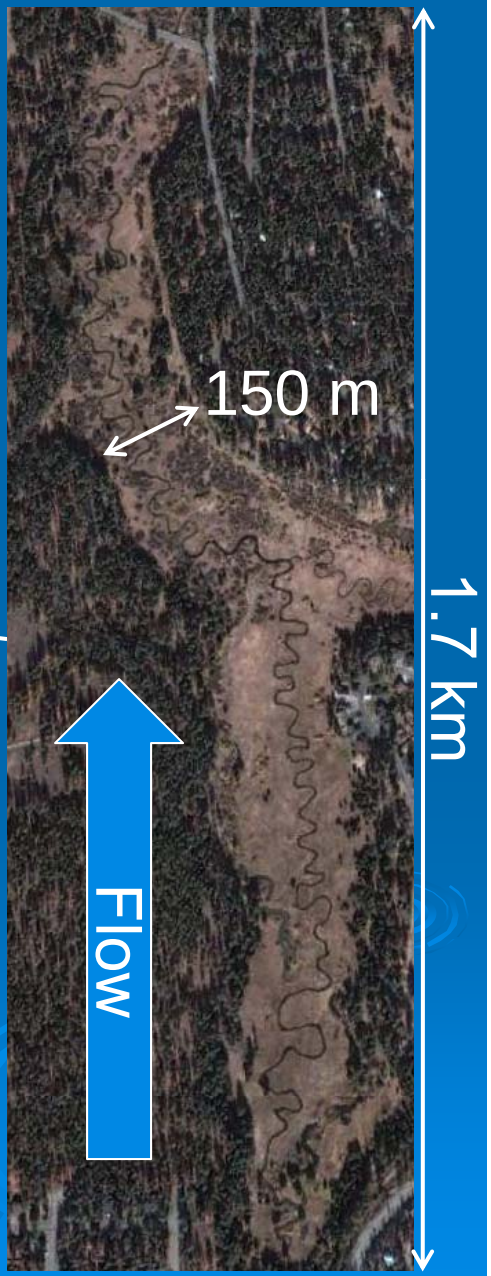
Modeling Site

Trout Creek

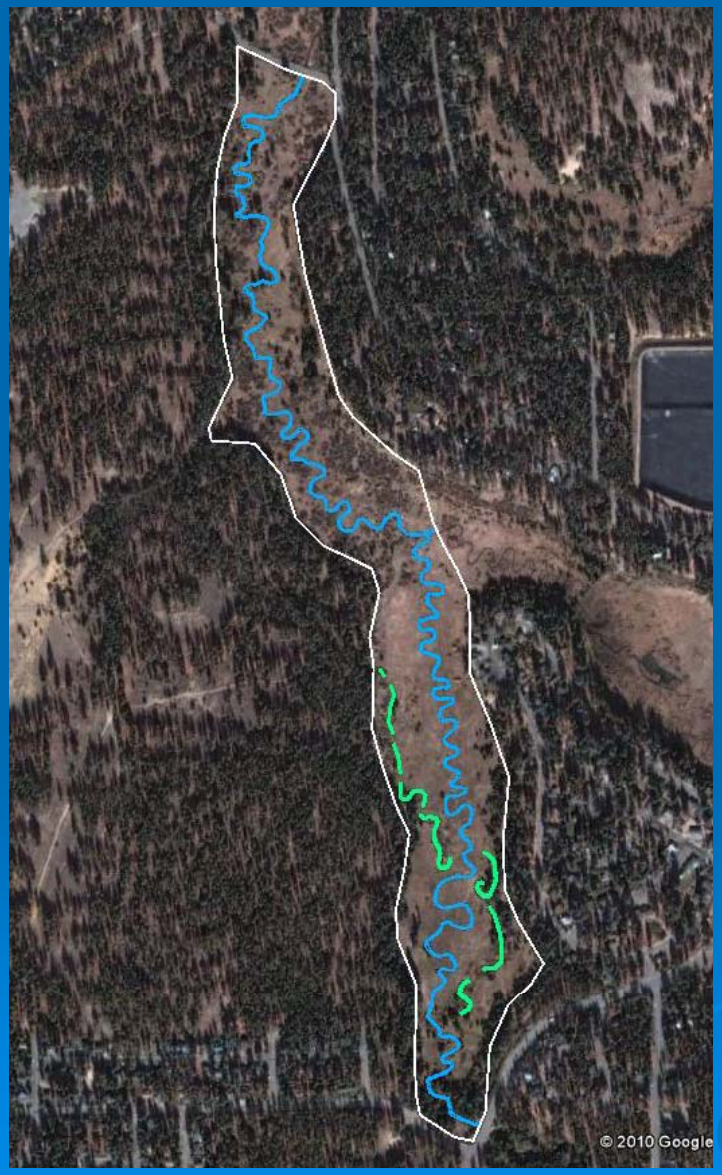
Site

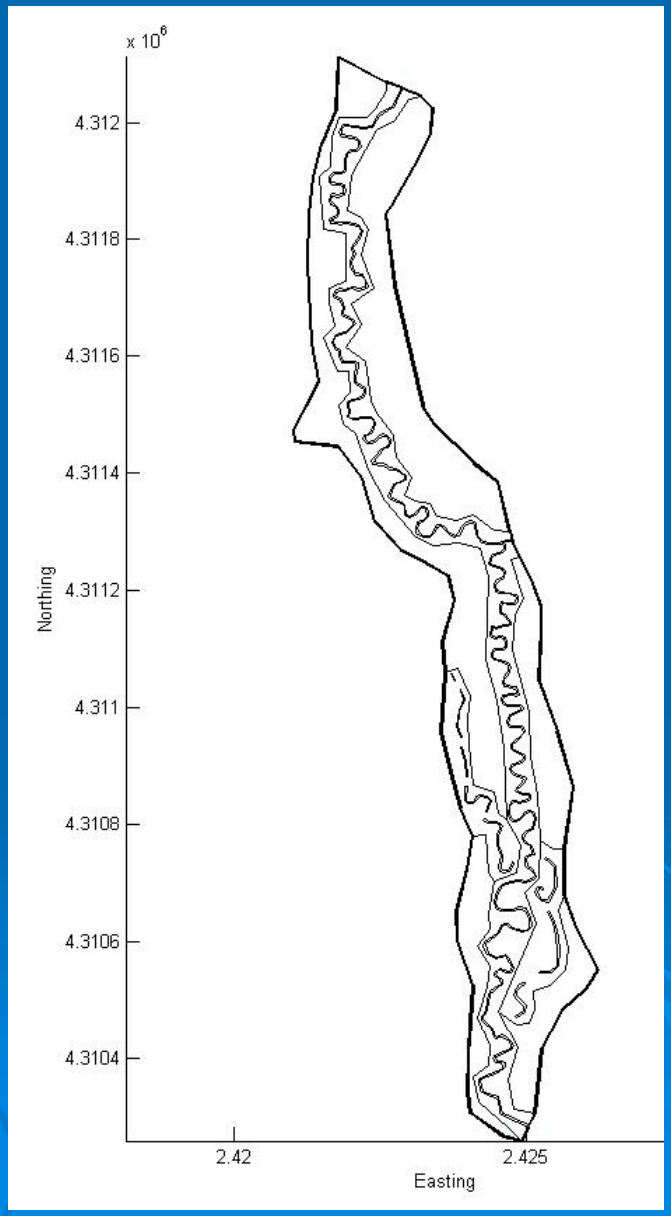
Upper Truckee

Cold Creek

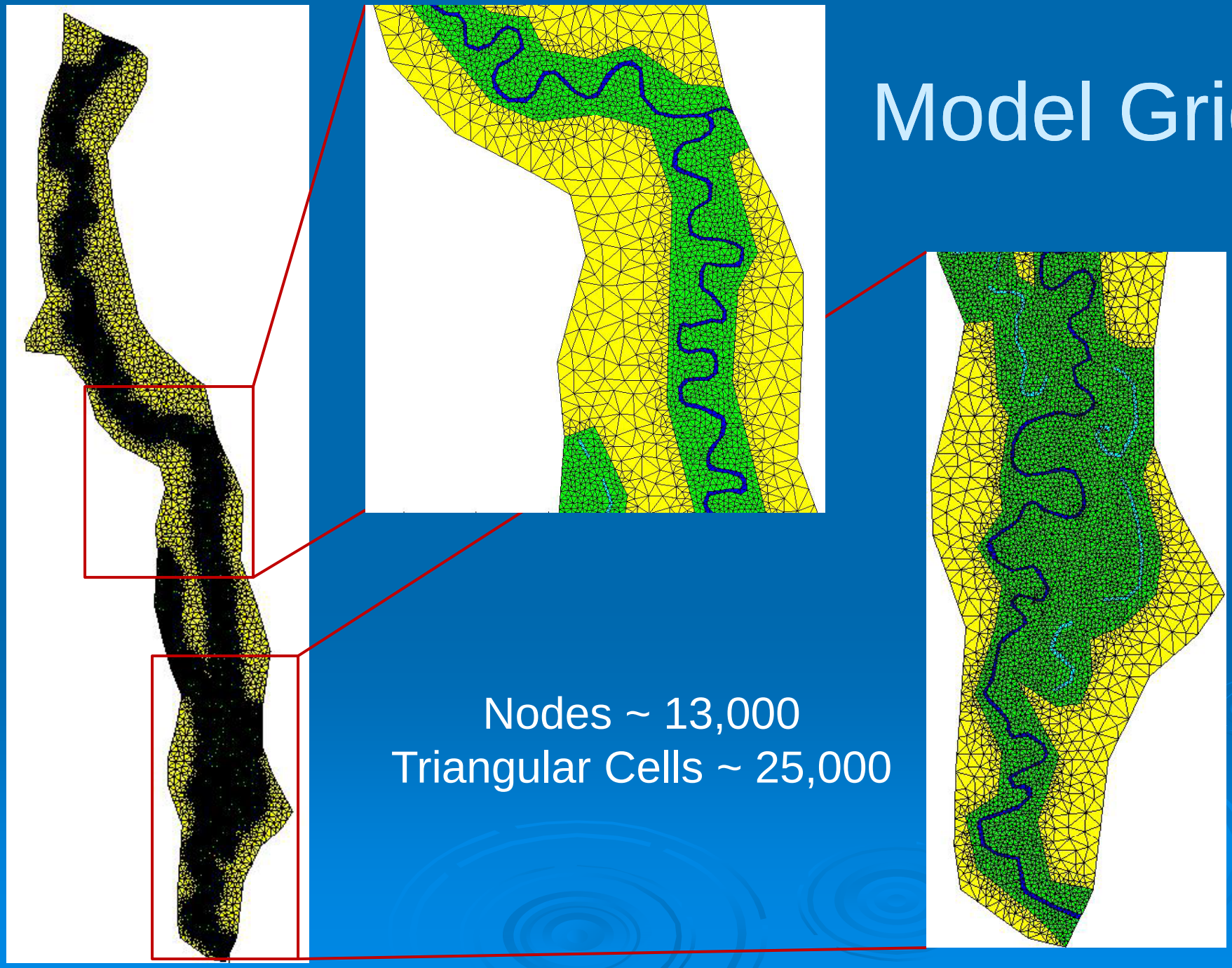


Site Demarcation Using Google Earth



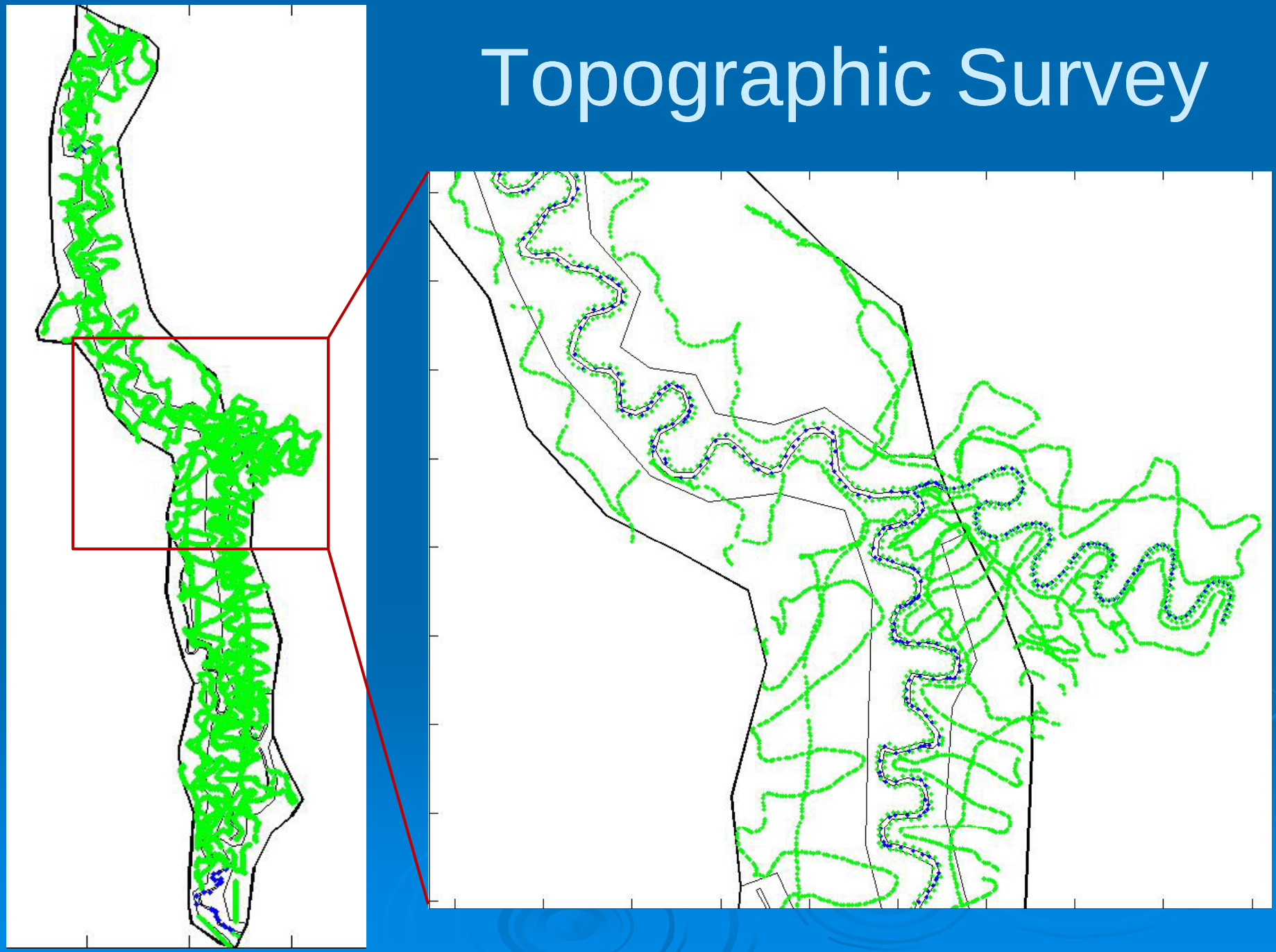


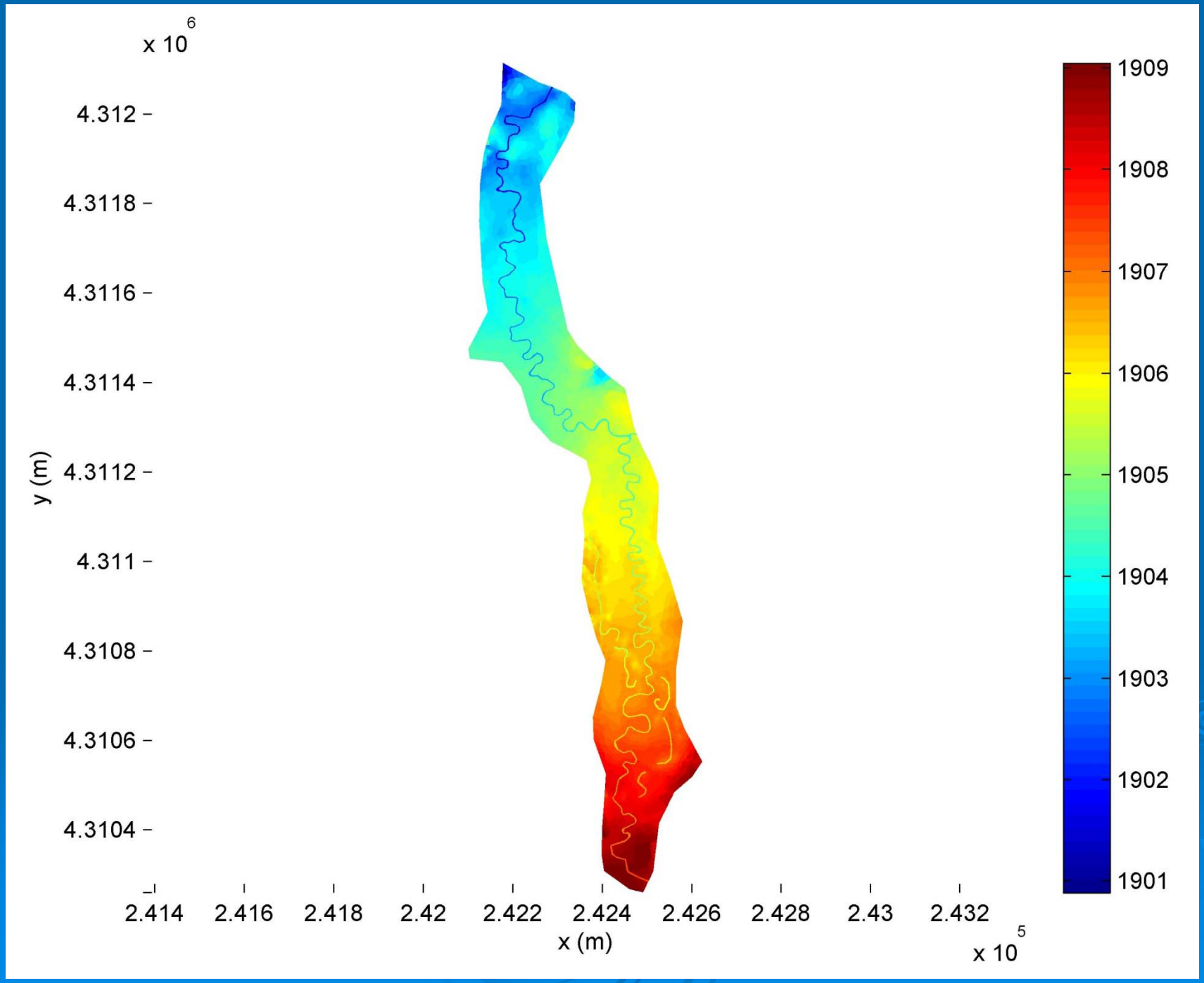
Model Grid



Nodes ~ 13,000
Triangular Cells ~ 25,000

Topographic Survey

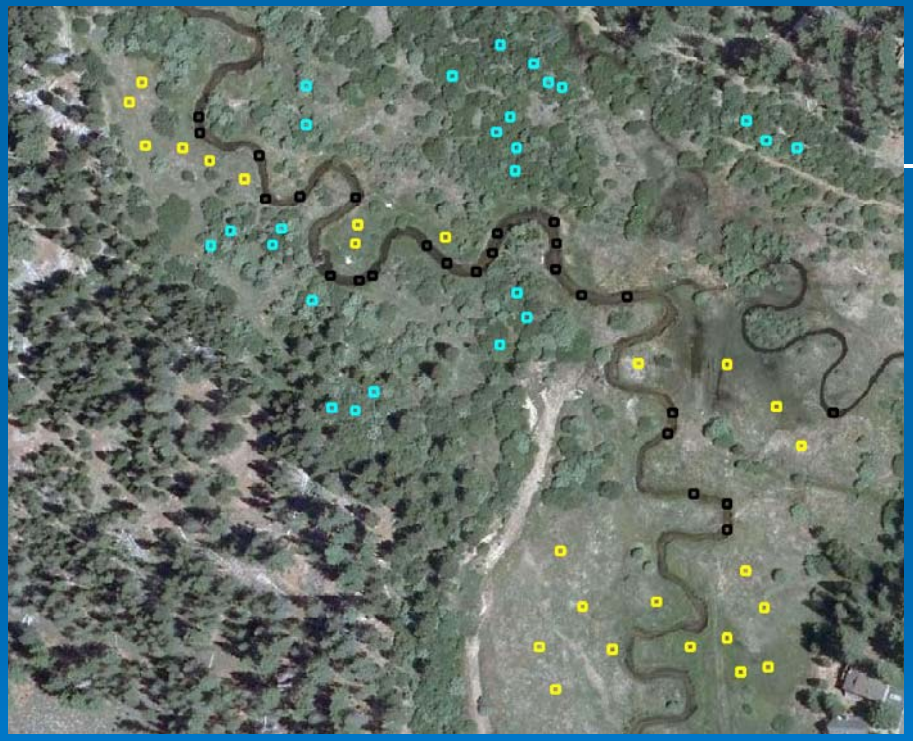



x 10^6
4.312
4.3118
4.3116
4.3114
4.3112
4.311
4.3108
4.3106
4.3104
y (m)
2.414
2.416
2.418
2.42
2.422
2.424
2.426
2.428
2.43
2.432
x (m)
x 10^5
1909
1908
1907
1906
1905
1904
1903
1902
1901

Vegetation Influences

- Water velocities, depths by changing resistance to flow
- Evapo-transpiration
- Water temperature
- Suspended sediment removal
- Lots more

Aerial Image Processing for Vegetation Classification

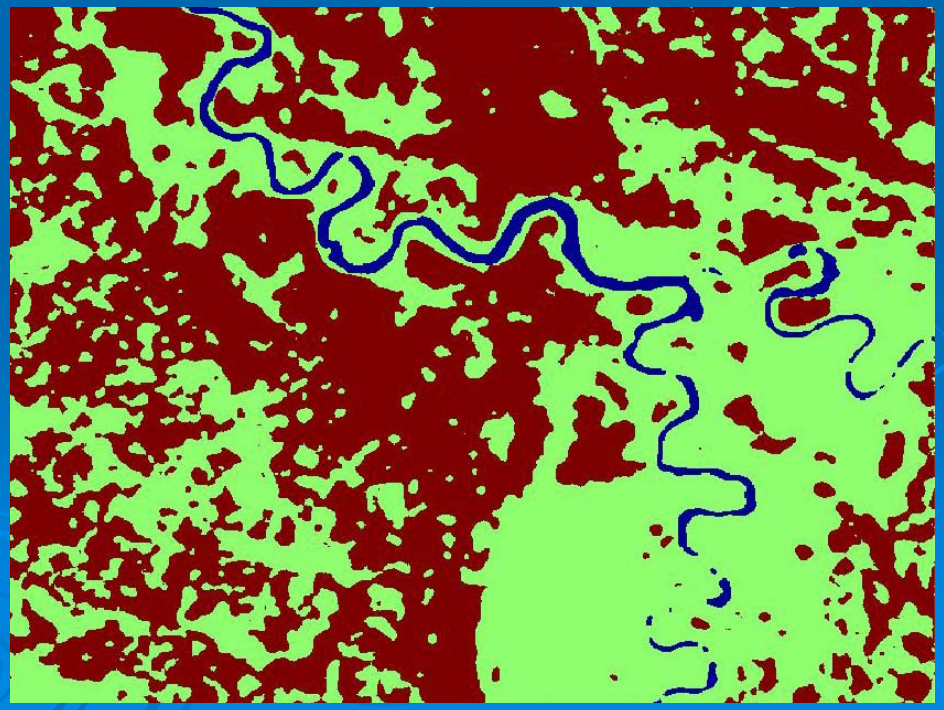


Training data

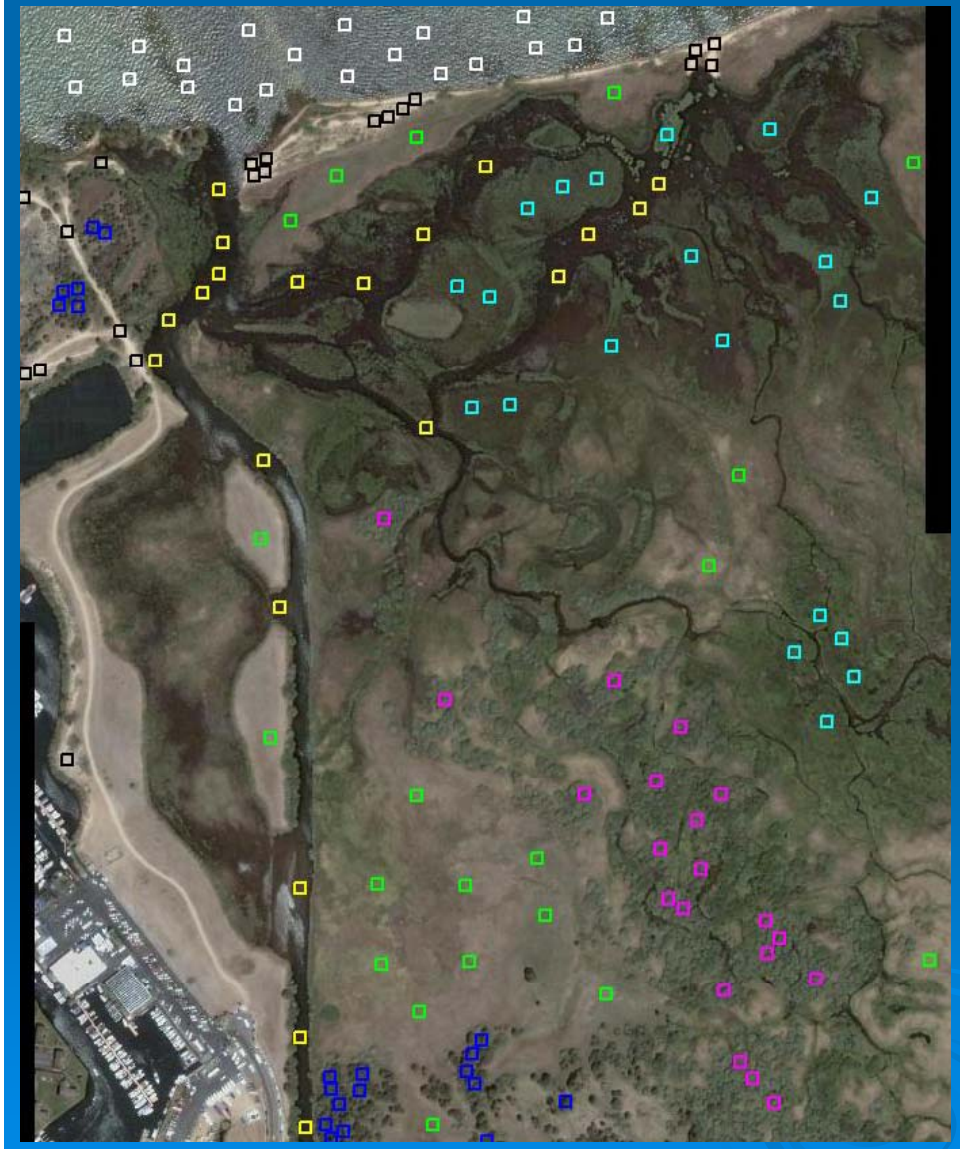
Smooth

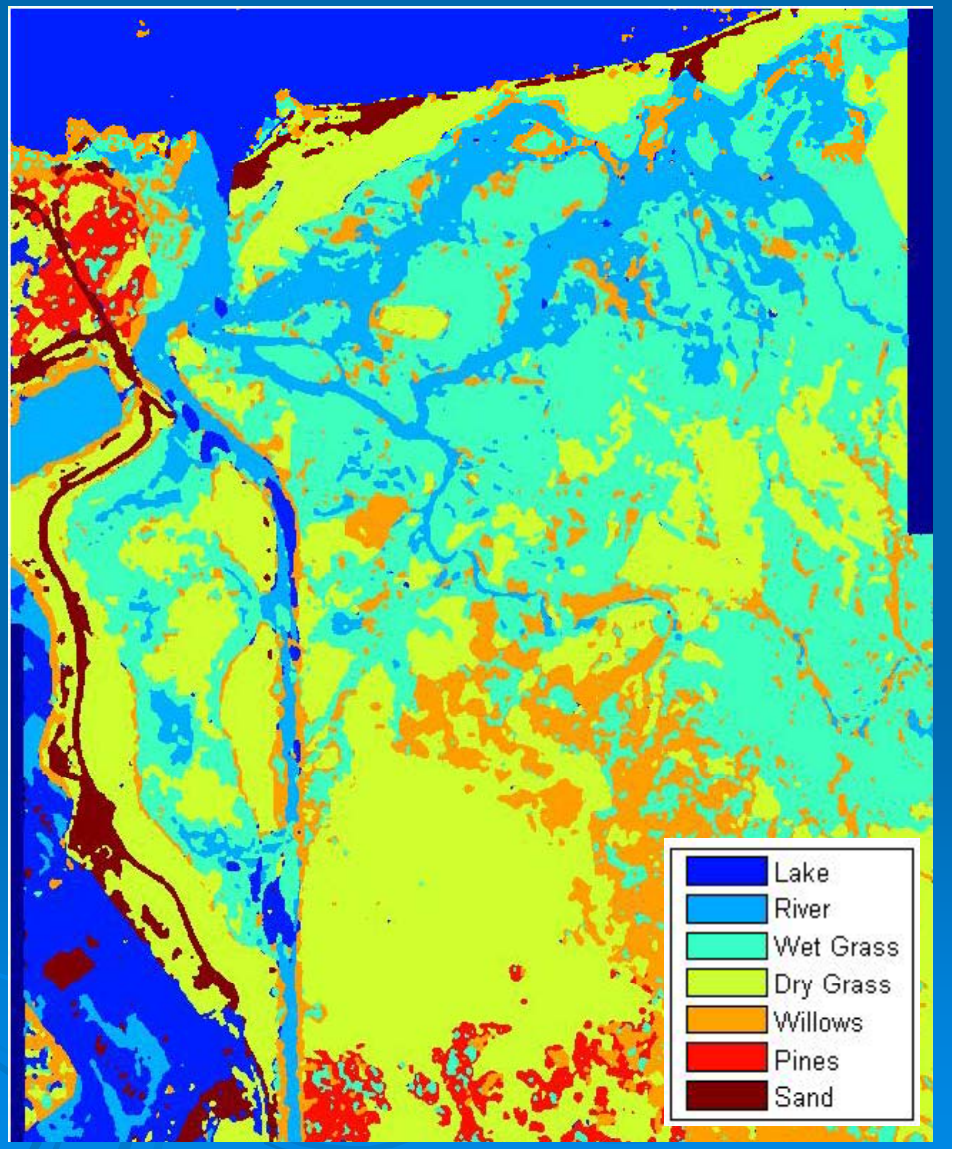
Rough

Classify based on pixel color and “texture”



Multiple Vegetation Classes



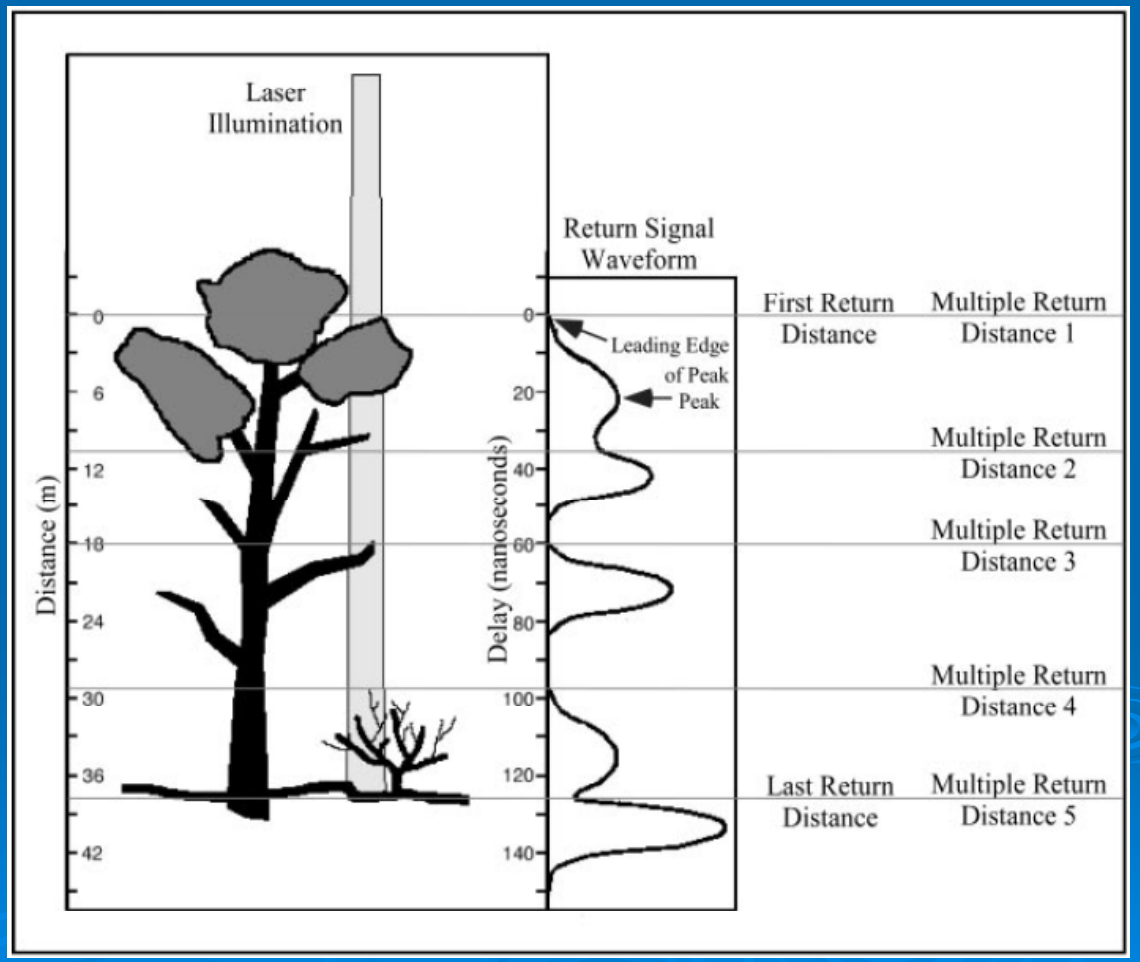


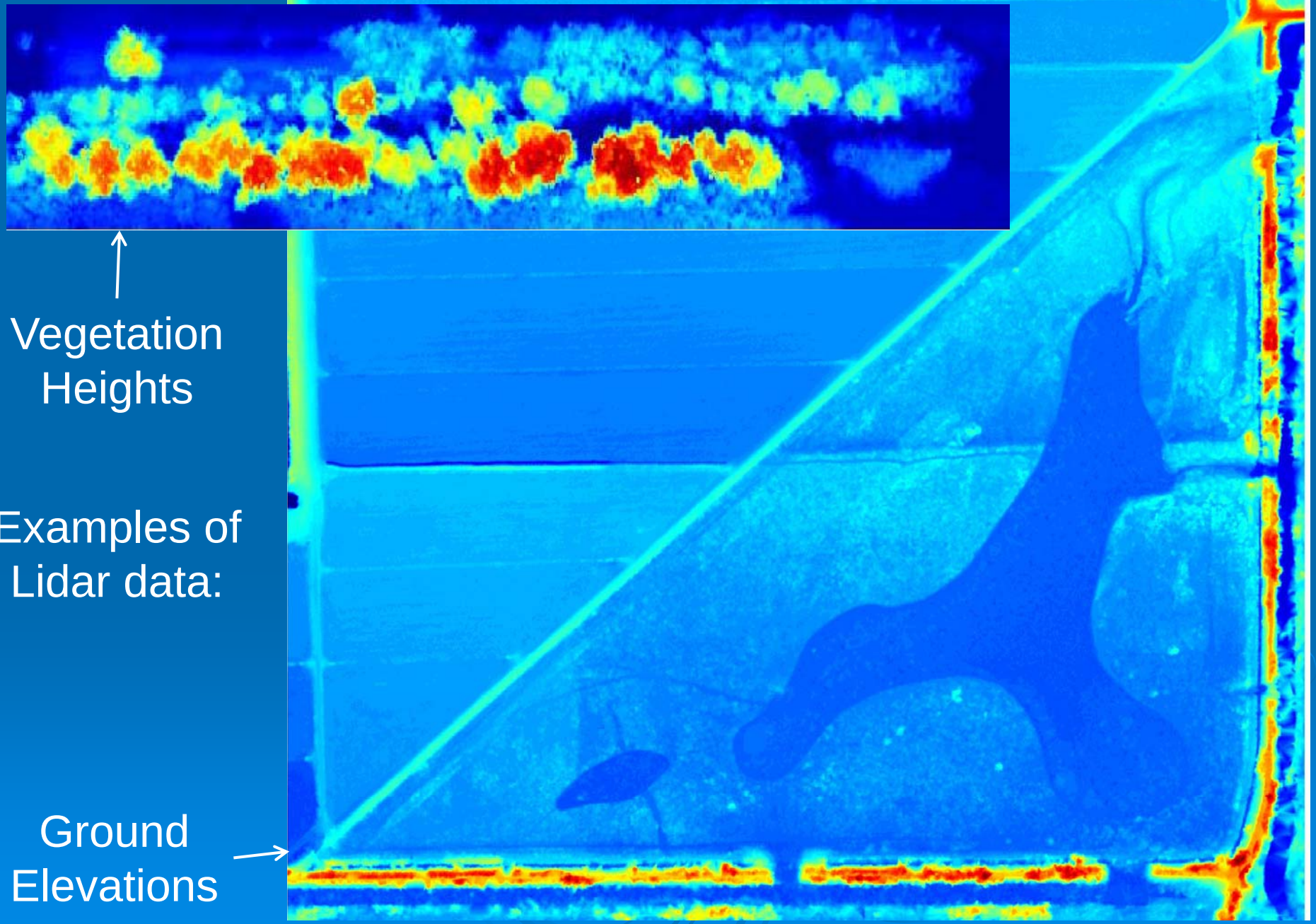
Vegetation Survey

- 2 classes – grass and willows
- Vegetation height
- Stem density
- Stem diameter

Lidar

- Ground elevations
- Vegetation heights
- Vegetation densities





Vegetation Heights

Examples of Lidar data:

Ground Elevations