

TEUI-Geospatial Toolkit: A Landscape Analysis Extension for ArcGIS



2007 ESRI Federal User Conference
Washington Convention Center
Washington, D.C.



Terrestrial Ecological Unit Inventory

Purpose:

To classify ecosystem types and map land areas that have similar capabilities and potentials for management

(Cleland et al. 1997)

Terrestrial Ecological Unit Inventory

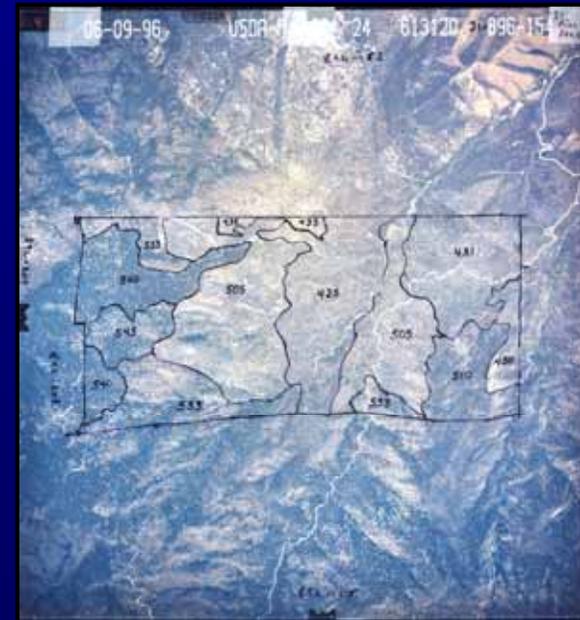
What is TEUI?

- Objective of TEUI is to map and classify ecological units based on landscape variables
- TEUI products include databases, maps, unit descriptions, and ecological interpretations
- Products stratify the landscape and provide baseline resource information for conducting:
 - ◆ Watershed assessments
 - ◆ Project-level analysis and planning
 - ◆ Forest Plan revisions

Traditional Mapping Process

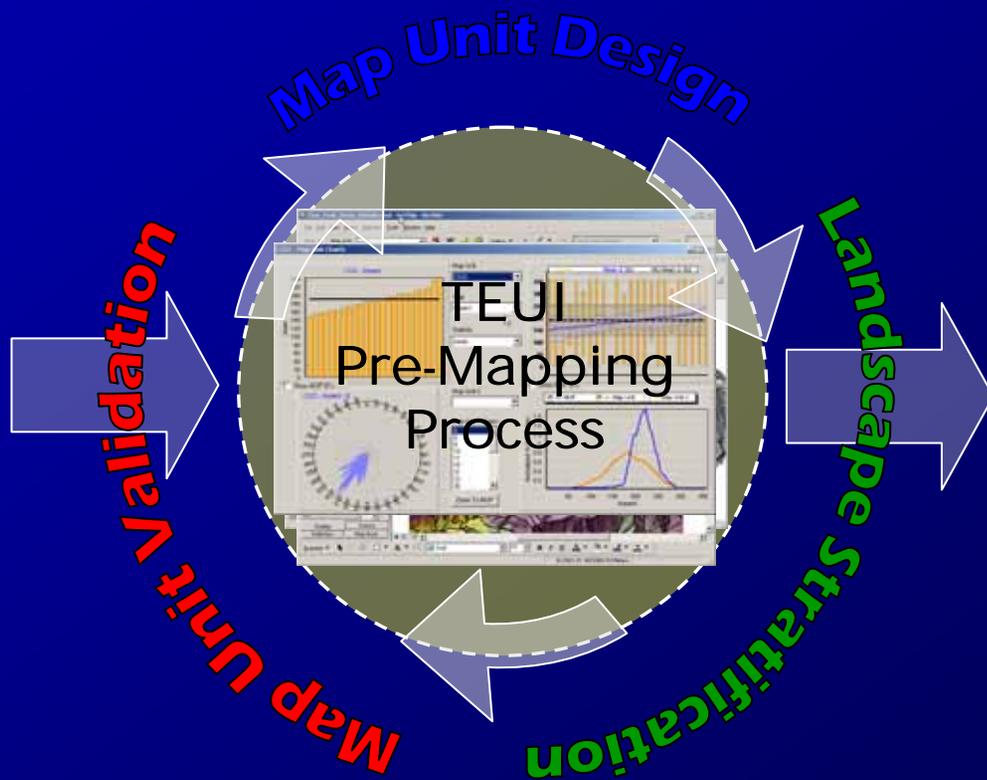
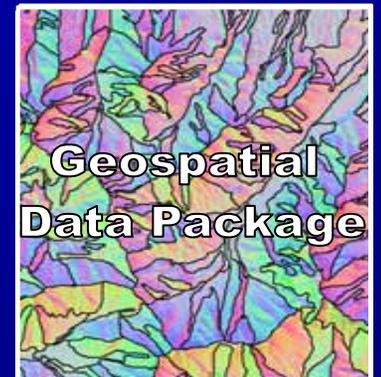
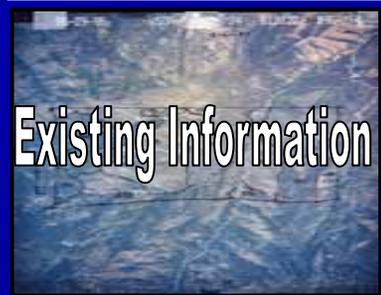
Example: Soil Survey, Vegetation Mapping etc.

- ◆ Traditional landscape stratification process is effective but expensive and time consuming
- ◆ Activities include:
 - 1:24,000 scale aerial photos
 - ~20 aerial photos per 7.5 min quad
 - Transfer line work and map symbols to orthophoto base maps
 - Digitize orthophoto map base
 - Return for edits and corrections

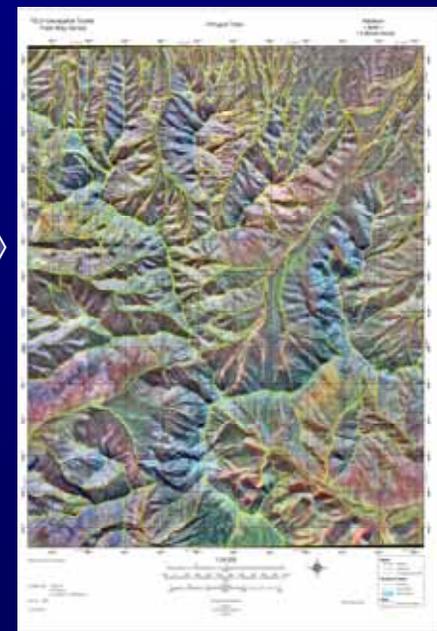


TEUI Geospatial Toolkit

Streamlines the Traditional Mapping Process

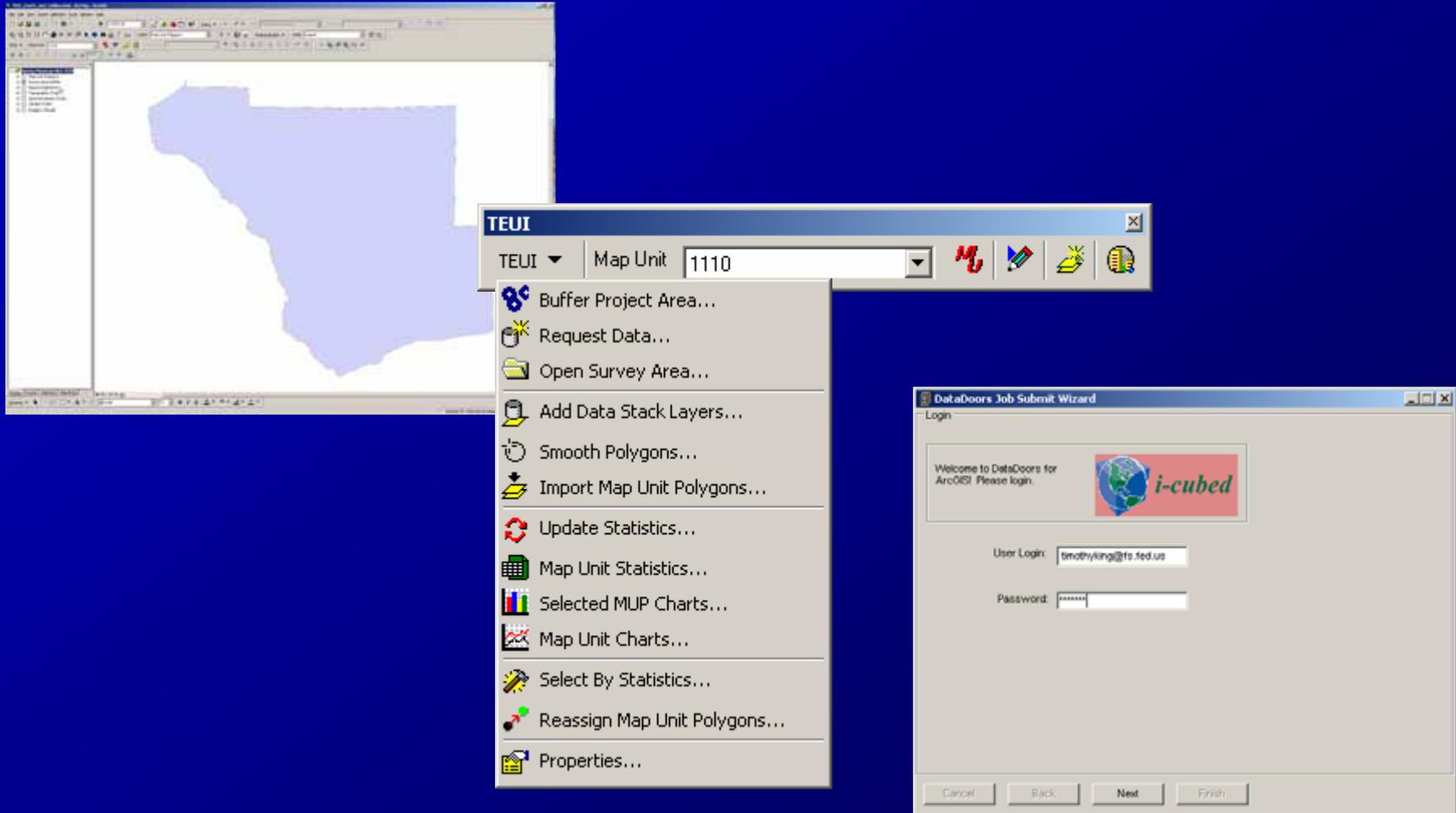


Generate Field Maps



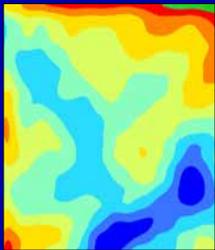
Data Provisioning System

- Use the TEUI Geospatial Toolkit to Request Data



Geospatial Data Package

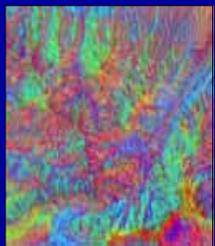
- The Geospatial Data Package contains up to 33 raster and 21 vector layers.



Daymet Climate Data (1km)



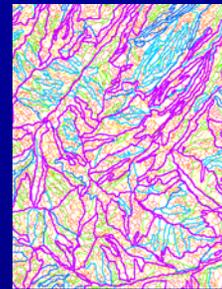
Topographic Derivatives (10m)



Spectral Derivatives (30m)



Imagery



Natural Segments



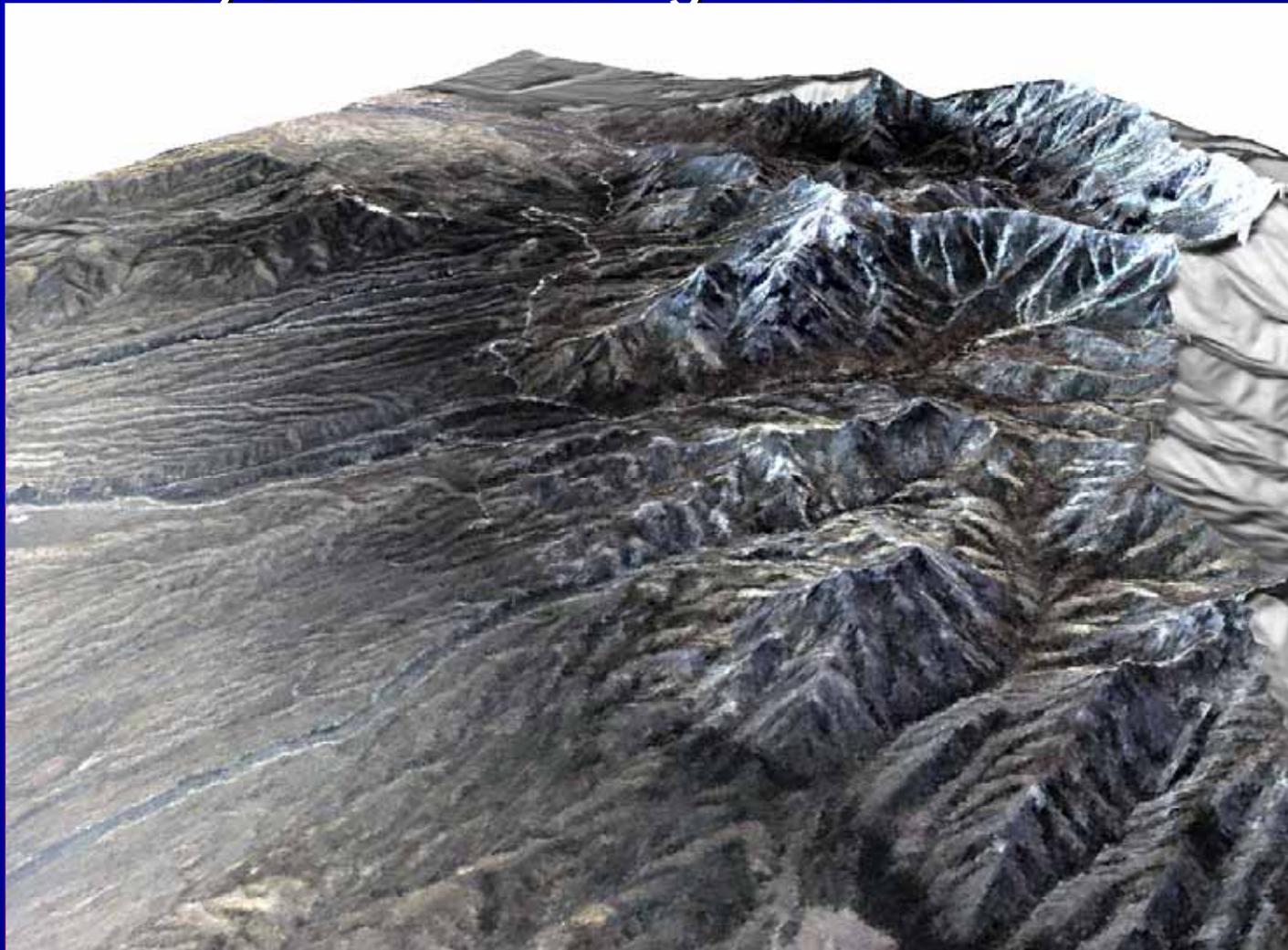
Topo Derived Vectors



USFS CFF Shapefiles/Covs

Map Unit Design

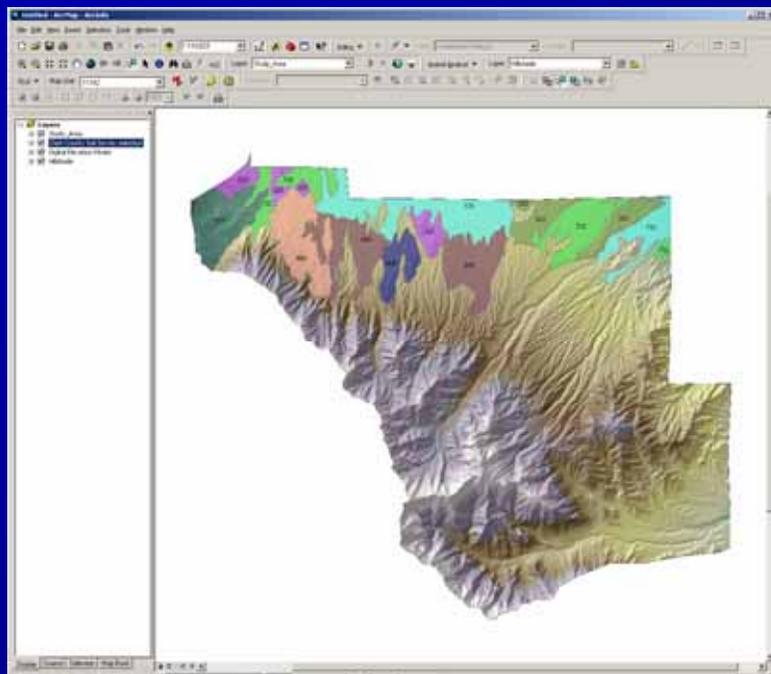
- Users can save time and money by viewing their study area in 3D using ArcScene.



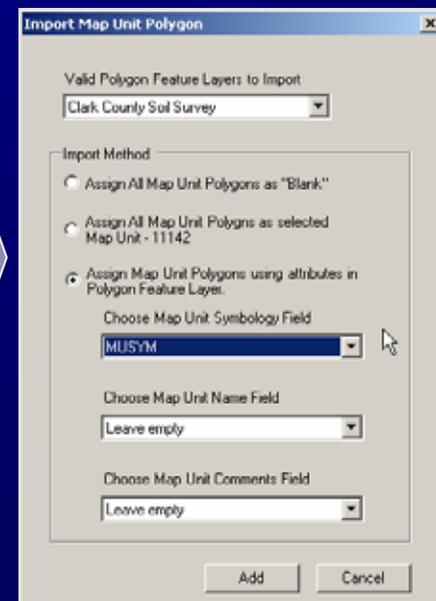
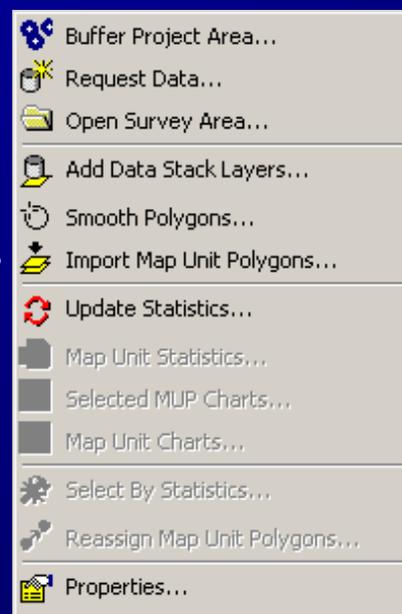
Elevation
Percent Slope
Aspect
Topographic Wetness
Floodplain
Fully Illuminated Hillshade
Daily Average Temperature
Daily Average Radiation
ETM_DOQ merge (4,5,3)
Vegetation Enhancement
Soil Enhancement
ETM Multispectral (4,3,2)
ETM Pan Sharpened(4,3,2)

Import Polygons and Define Map Units

- If you have an existing dataset that has a Map Unit Design that works for your study area, you can import it into the TEUI Toolkit using the Import Map Unit Polygons Tool.

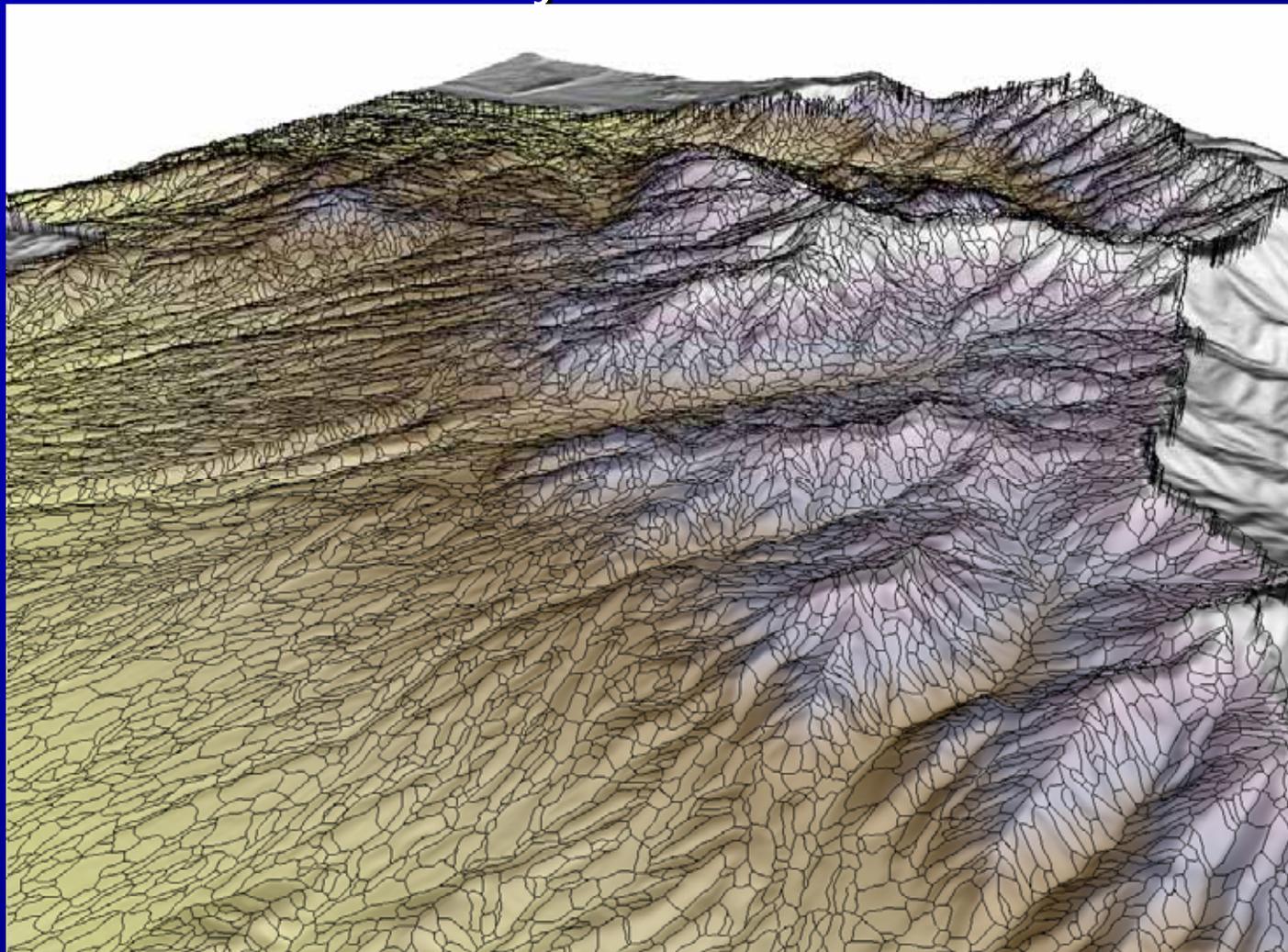


Certified NRCS Soils Data Bordering the Study Area



Natural Segments

- The Natural Segments data can be imported if there is no existing data within the study area as an initial stratification.

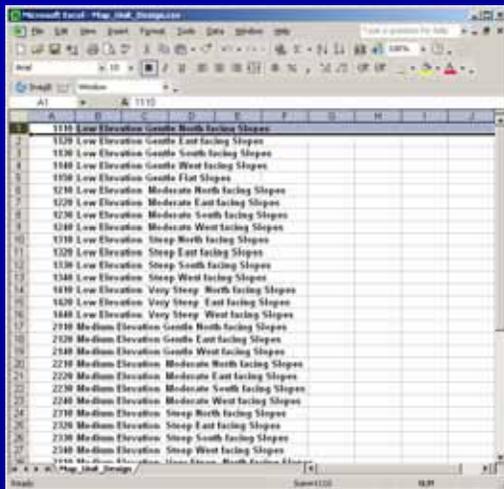


Natural Segments

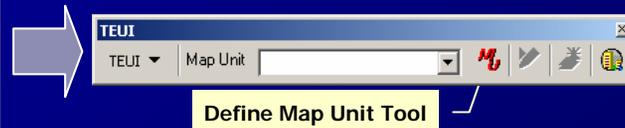
Level 7
Level 6
Level 5
Level 4
Level 3
Level 2
Level 1

Import Polygons and Define Map Units

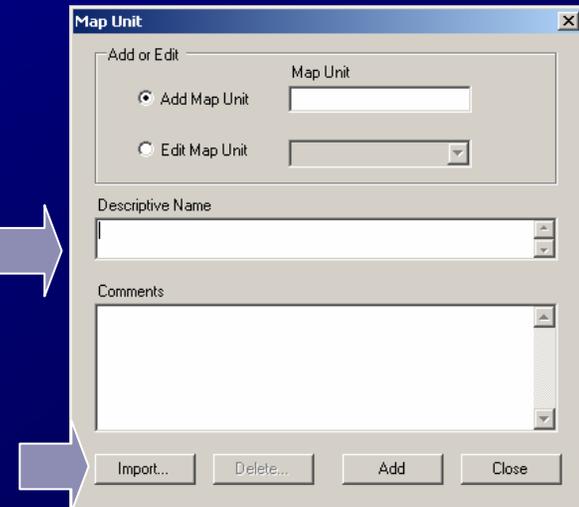
- Users can also import a Map Unit Design using the Define Map Unit Tool.
 - ◆ Create a Map Unit Design in a spreadsheet program and save it as a .csv file
 - ◆ Open the Define Map Unit Tool on the TEUI Toolbar
 - ◆ Click Import and browse to the .csv file



Map Unit Design in Spreadsheet Program



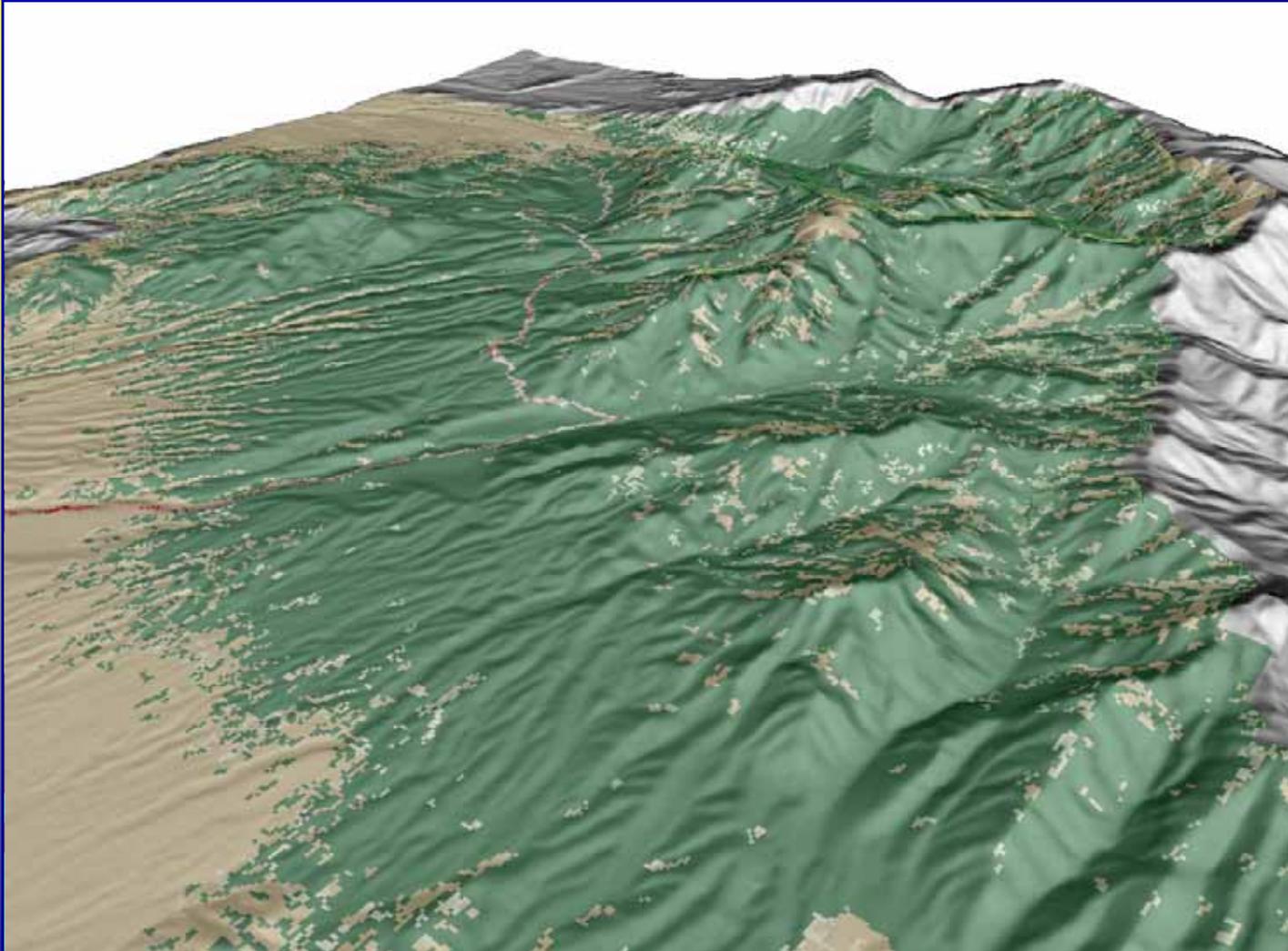
TEUI Toolbar



Map Unit Define Dialog Window

Register Additional Raster Data

- Additional raster data can be registered into the datastack.



Geology

Geology (Clark County)	
Unit and Description	
CZw	Wood Canyon Formation (Lower Cambrian and Late Proterozoic)
Cb	Bright Angel Shale (Middle and Lower Cambrian)
Cbk	Bonanza King Formation (Upper and Middle Cambrian)
Cc	Carrara Formation (Middle and Lower Cambrian)
Cn	Nopah Formation (Upper Cambrian)
Ct	Tapeats Sandstone (Lower Cambrian)
DOM	Mountain Springs Formation (Middle Devonian, Upper Ordovician)

Landcover (SWGAP)

Landcover (SWGAP)	
Description	
Recent Fire	(8)
Water	(7)
Riparian	(6)
Conifer	(1)
Woodland	(3)
Non-veg	(9)
Shrubland	(4)
Herbaceous	(5)

Soils

Clark County Soil Survey	
MUSYM	
322	
323	
351	
421	
716	
731	
732	
775	

Landcover (NLCD)

Landcover (NLCD 2001)	
(21) Developed, Open Space	
(22) Developed, Low Intensity	
(23) Developed, Medium Intensity	
(31) Barren Land (Rock/Sand/Clay)	
(41) Deciduous Forest	
(42) Evergreen Forest	
(42) Mixed Forest	
(52) Shrub/Scrub	
(71) Grassland/Herbaceous	

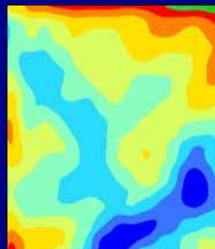
Working with TEUI Tabular Statistics

- Create Statistics on Raster Traits

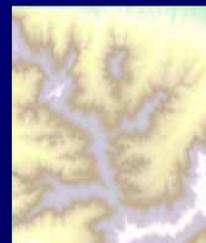
The TEUI Toolkit creates the statistics shown below for all polygons that have been imported or created within the study area.

Acres	Range
Mean	Majority
Standard Deviation	Minority
Min	Median
Max	Variety
	Sum

The Traits that the statistics are calculated on can be any raster data that is supplied with the GDP or data that you registered with the Toolkit.



Total Precipitation
Daily Average Temperature
Daily Average Radiation
Growing Degree Days



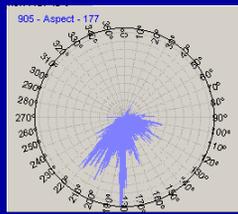
Aspect, Slope, Elevation, Curvature
CTI Topographic Wetness

Using the TEUI Charting and Statistical Tools

- The Map Unit Charts function creates interactive graphs and charts showing a wide variety of information that can be used to assess your map unit polygons.

MU Trait and MUP Trait Statistics

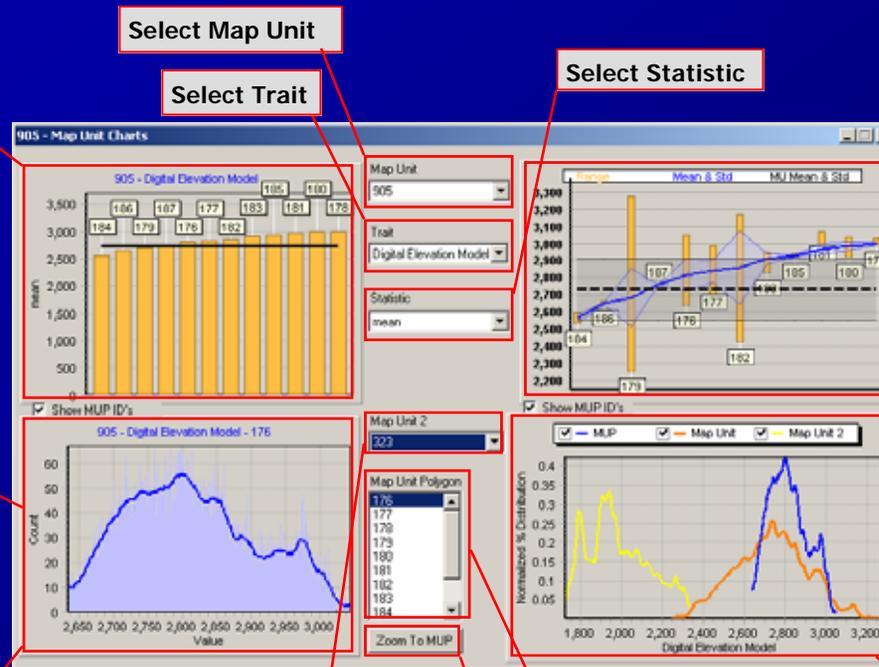
- Orange Bars**— range from zero to the selected Trait statistic value for each MUP.
- Black Line**- statistic for the selected MU Trait.



The view changes to this display when aspect is the selected trait.

MUP Trait Pixel Distribution

- Light Blue Vertical Lines** - value and the count (frequency) for the selected MUP Trait.
- Dark Blue Line** - the average of 20 counts (10 on both sides of each value) for the selected MUP Trait



Select Map Unit

Select Trait

Select Statistic

Select Map Unit 2

Zoom to Selected MUP

Selected MUP ID within MU

MUP Trait Range, Mean, StdDev and MU Trait Mean and StdDev

Top of Orange Bars— maximum value of the selected trait for one polygon.

Bottom of Orange Bars— minimum value of the selected trait for one polygon.

Solid Blue Line - mean value for the Trait for each polygon.

Dashed Black Line - mean value of the selected Trait for the entire MU.

Normalized Distribution of MU Trait and MUP Trait and MU2 Trait

Dark Blue Line - normalized percent distribution for the selected MUP Trait.

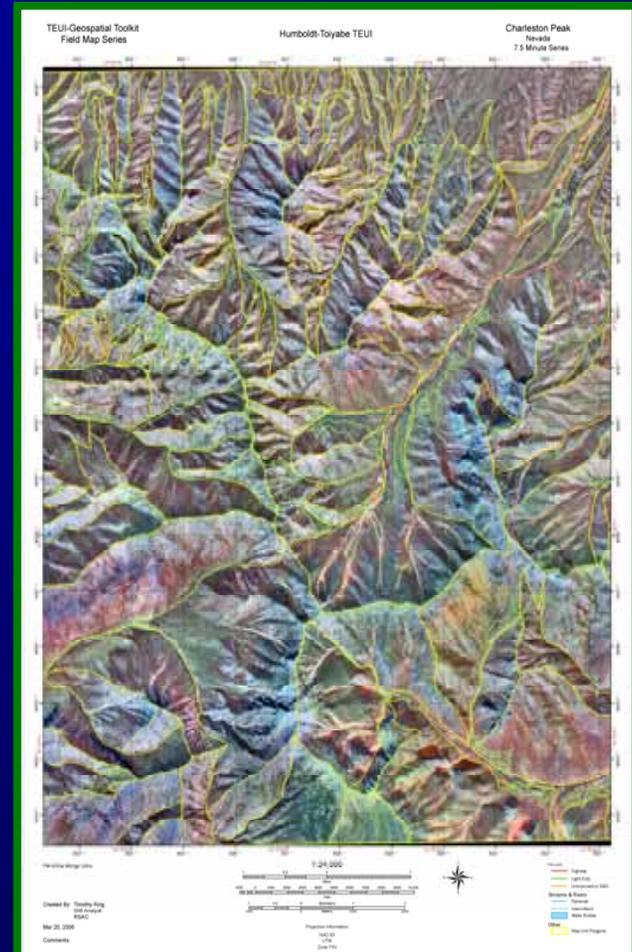
Orange Line - normalized percent distribution for the selected MU Trait

Yellow Line - normalized percent distribution for the selected MU2 Trait.

Generate Field Maps

Uses MapBooks

- ◆ Support field work and map unit documentation
 - Standardized Map Templates
 - 1:9,000
 - 1:12,000
 - 1:24,000
 - Project Area Map
 - Users can specify
 - Imagery
 - Map unit polygons
 - Field sample locations
 - Roads, trails, streams,...etc



Conclusions

The TEUI Geospatial Toolkit:

- ◆ Streamlines the TEUI Pre-mapping process
- ◆ Provides resource managers with a cost-effective alternative to traditional inventory
- ◆ Provides resource specialists with a set of practical tools for conducting resource inventory

“TEUI-Geospatial Toolkit”

