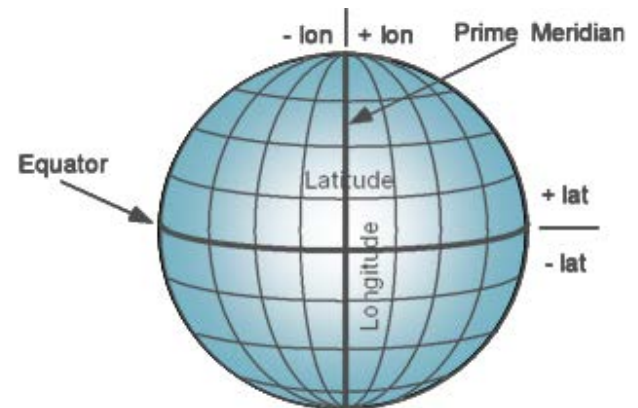
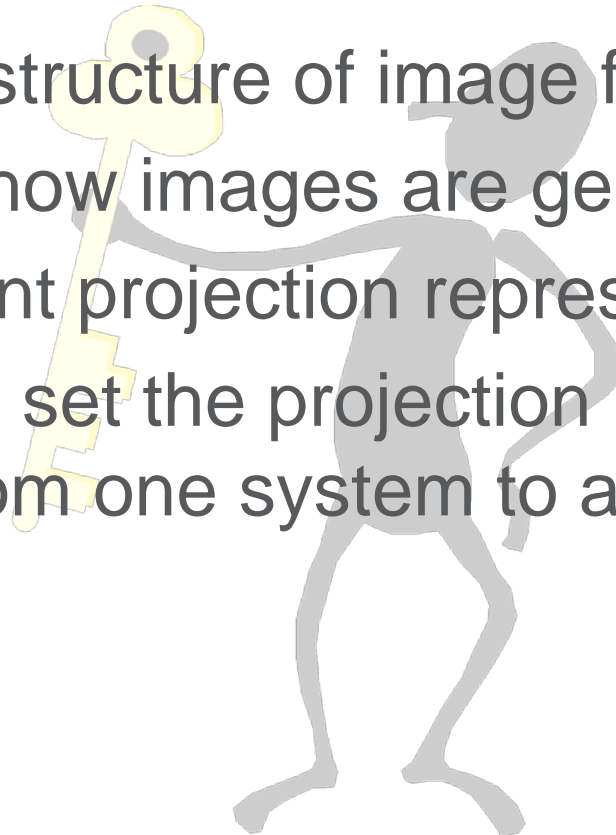


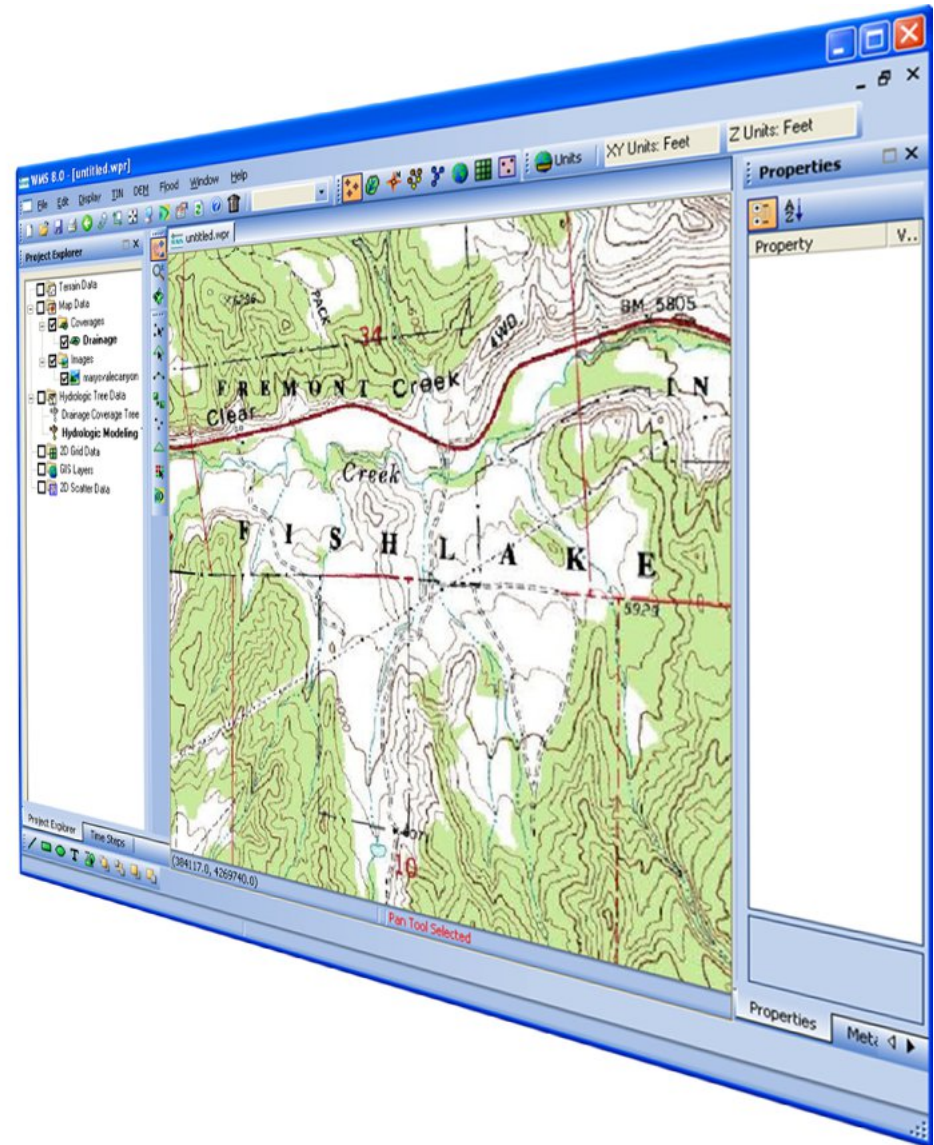
# Images and Projections



- Learn basic structure of image files
- Understand how images are geo-referenced
- Learn different projection representations
- Know how to set the projection in WMS and how to change from one system to another



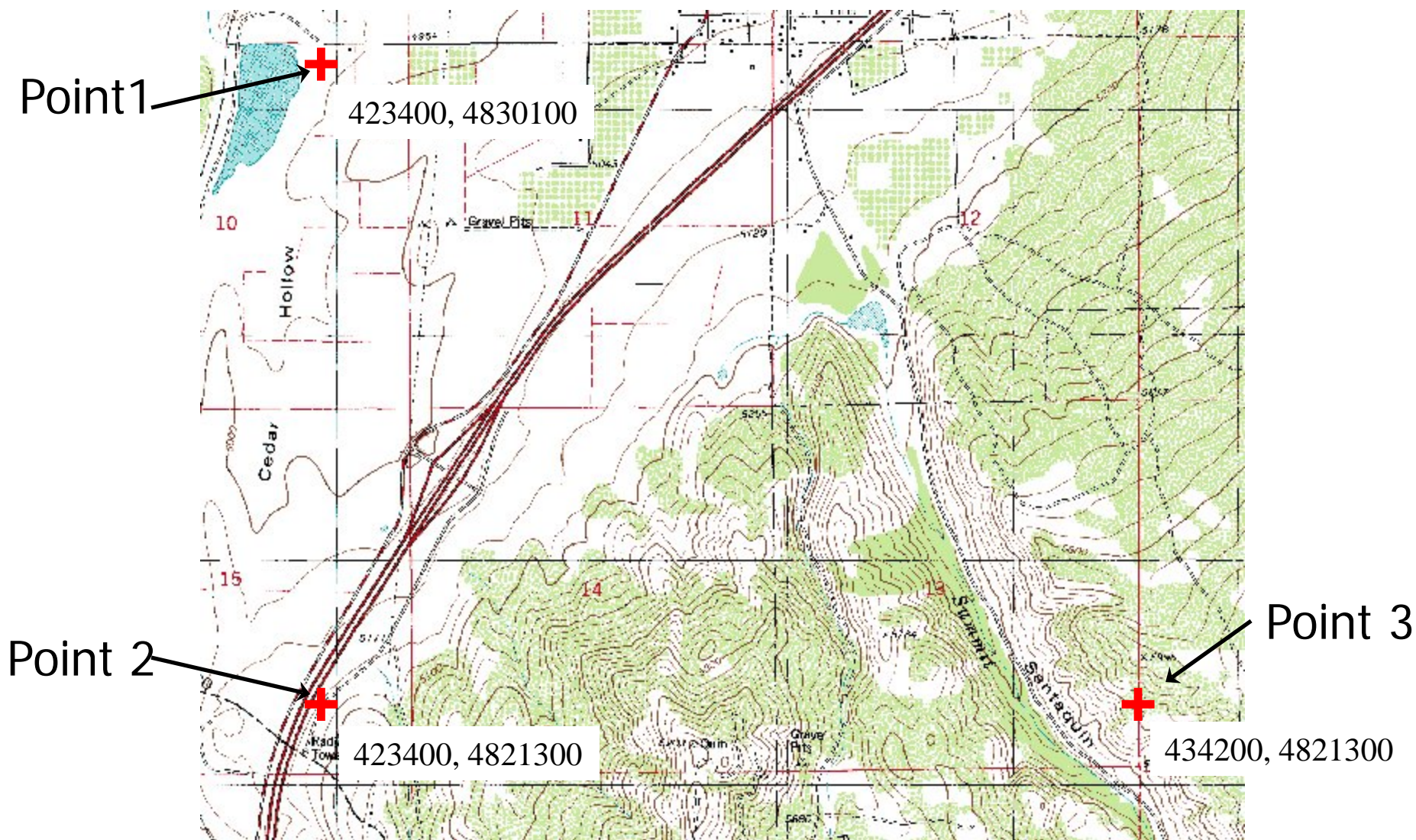
- Digital picture
- For our use, usually a picture of a map
  - Base map of your project
- Helps locate key features
  - Rivers, lakes, etc.
  - Roads
  - Land use
  - Much more...



- 2D array of pixels
- Color code for each pixel (red, green, blue)
- Each pixel has a size
- More pixels means...
  - More detail
  - Larger files
- File types
  - TIFF
  - JPEG
  - MrSID
  - Lots more...



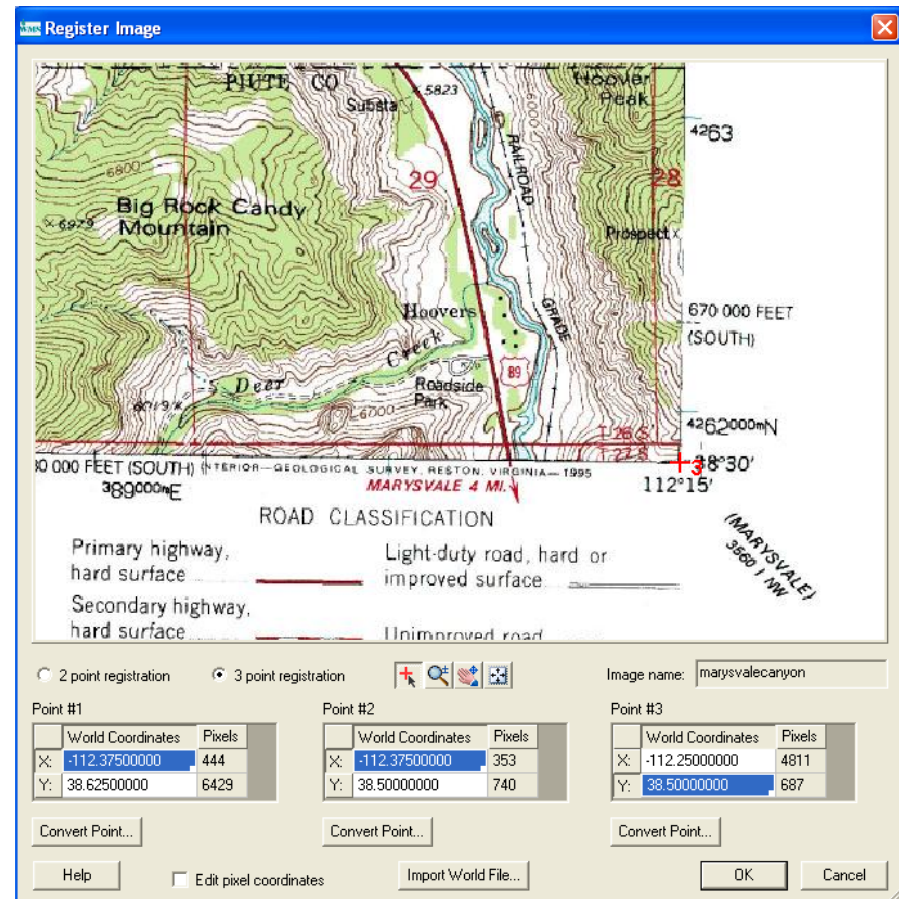




- Online Images
  - Registration information is included in the online interface
- GeoTiff
  - Registration information embedded in file
- World Files
  - Separate text files with registration information (.tfw, .jpgw)
- Manual
  - Scanned images, downloaded from the internet

2.000000	pixel size in x (meters)
0.000000	rotation term
0.000000	rotation term
-2.000000	pixel size in y (meters)
443600.00	
4456800.00	upper left coordinate

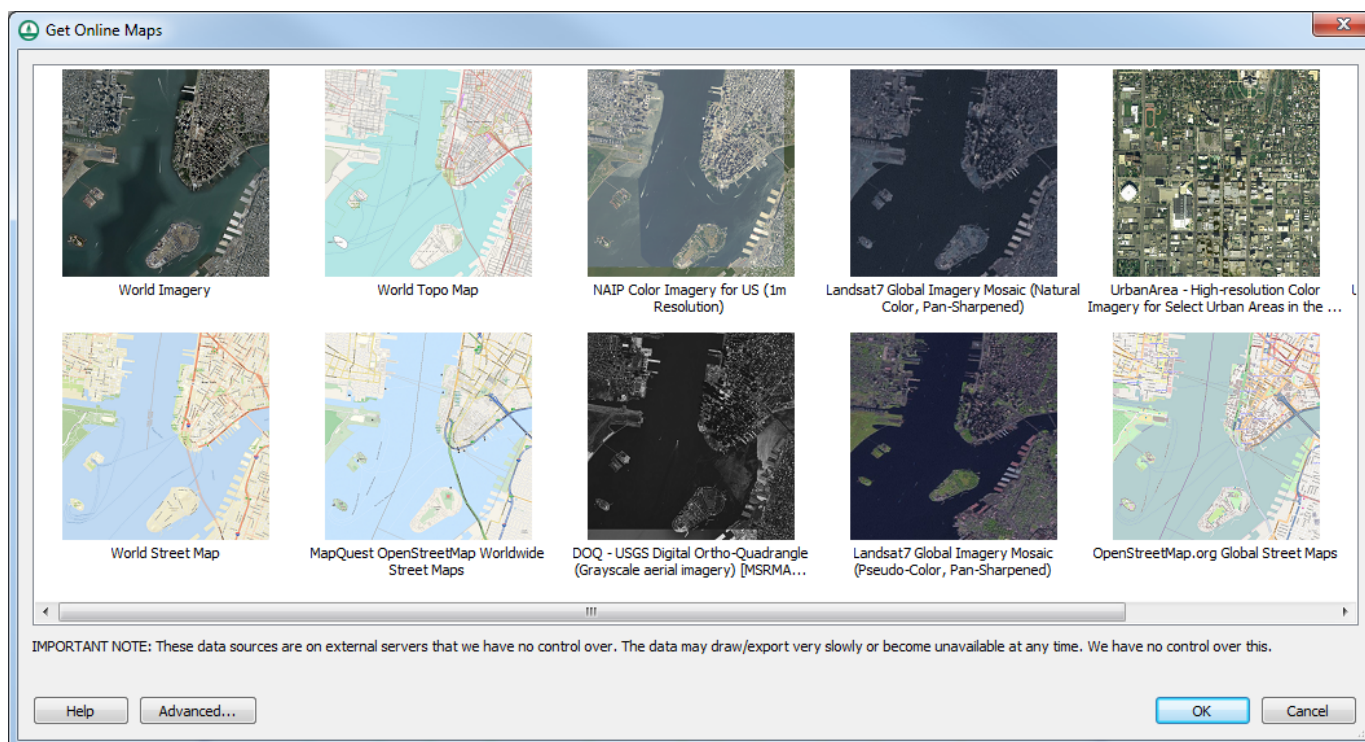
- 2 point or
- 3 point
- Move point to known location
- Enter coordinates
- Define projection



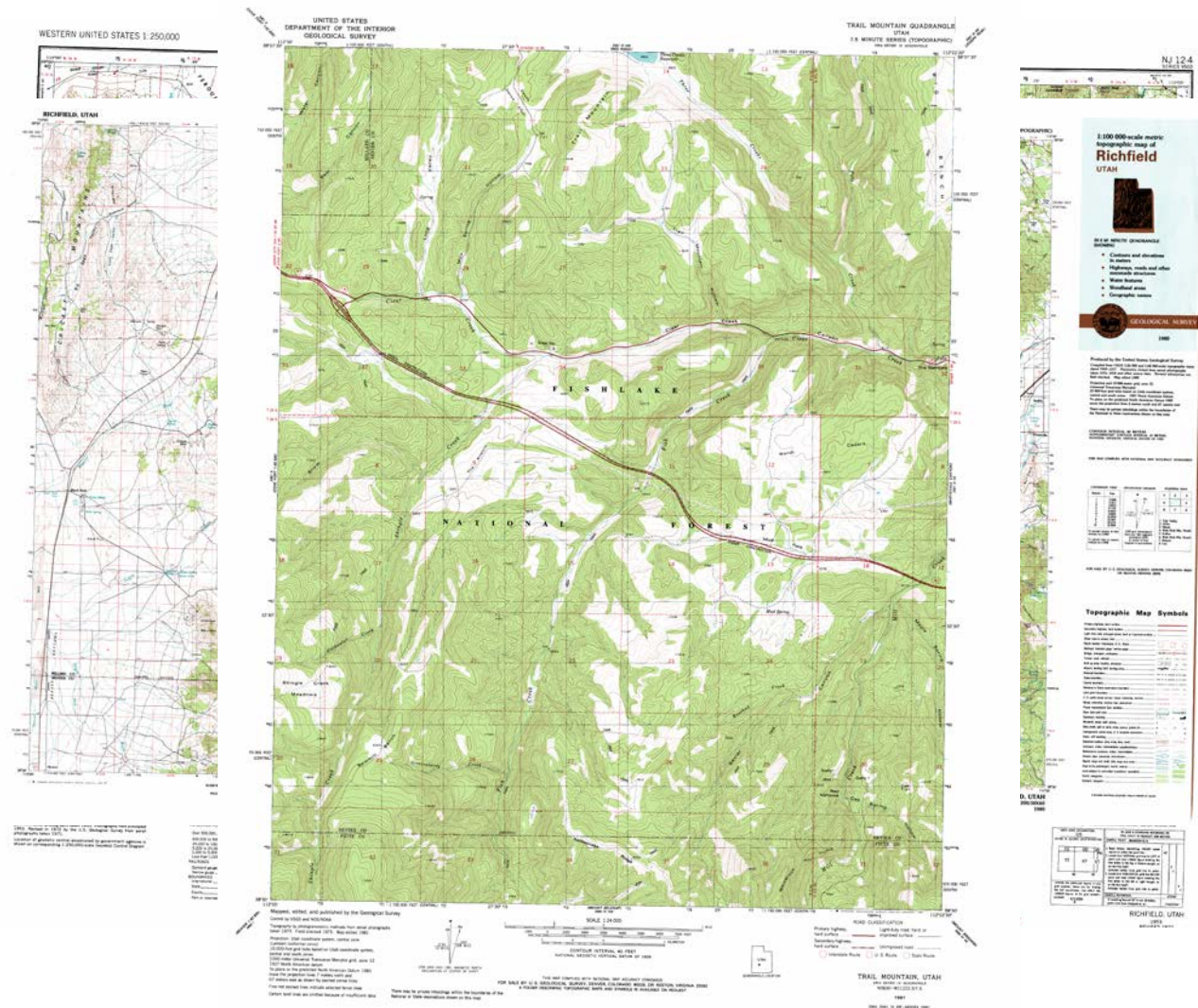


- Online Images From WMS—commonly used image types:
  - World Imagery: Quality aerial imagery for anywhere in the world
  - World Street Map
  - World Topo Map
  - Other Image Sources: USGS DRG and DOQ maps, open source maps
- USGS
  - Digital Raster Graphics (DRG) are the USGS map series saved as images
    - Available at many local locations
  - Digital Ortho Photo Quads (DOQ, DOQQ)
- NSS state equation region maps
- Use a desktop scanner or download an image and manually register any map or image

- Use the *Get Online Maps* tool in the *Get Data* toolbar to get online images
  - Several image types are available
  - Ability to convert online image to a static image



- 1:250,000
- 1:100,000
- 1:24,000





## ■ Aerial Photographs



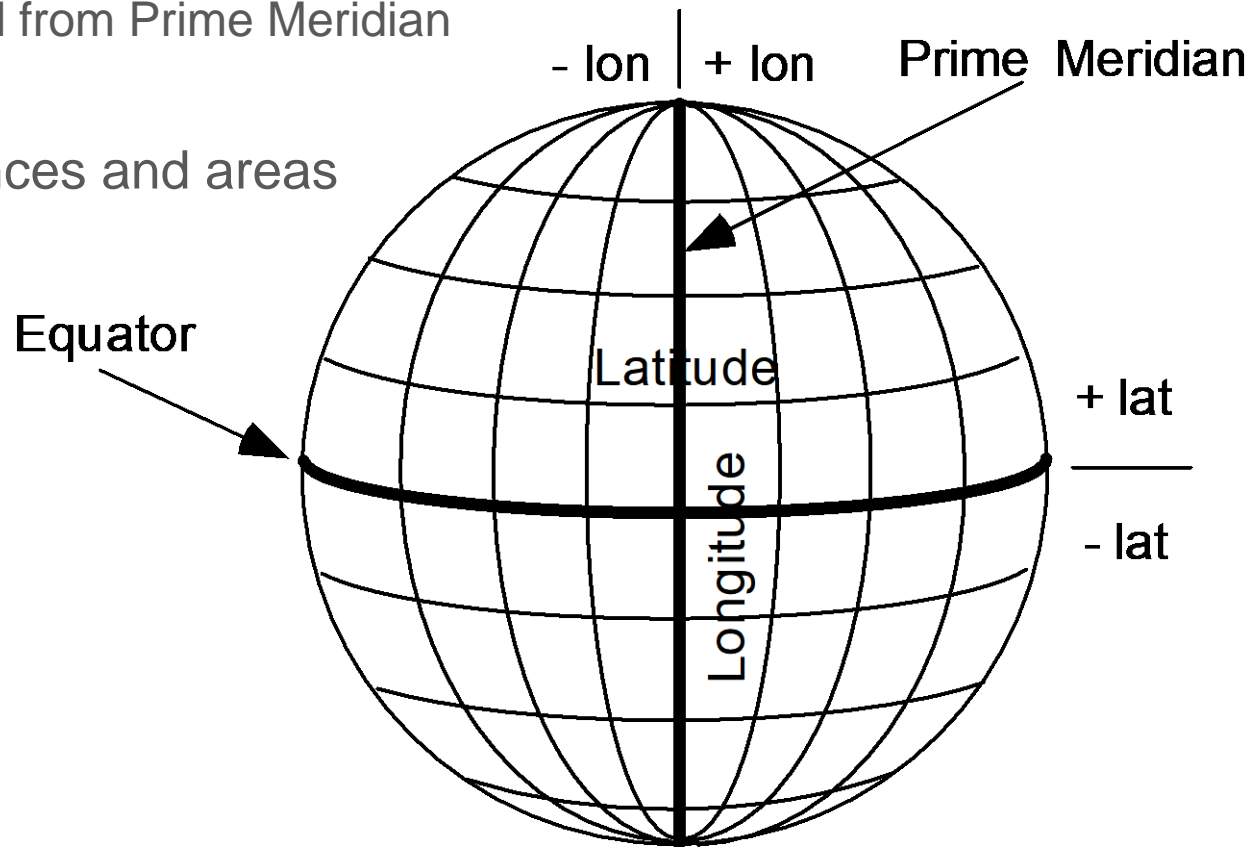
- Scan using a Desktop Scanner
- Save as JPEG or TIFF
- Register in registration dialog
- Save as a WMS Image File
  - Text file with image file name and registration points



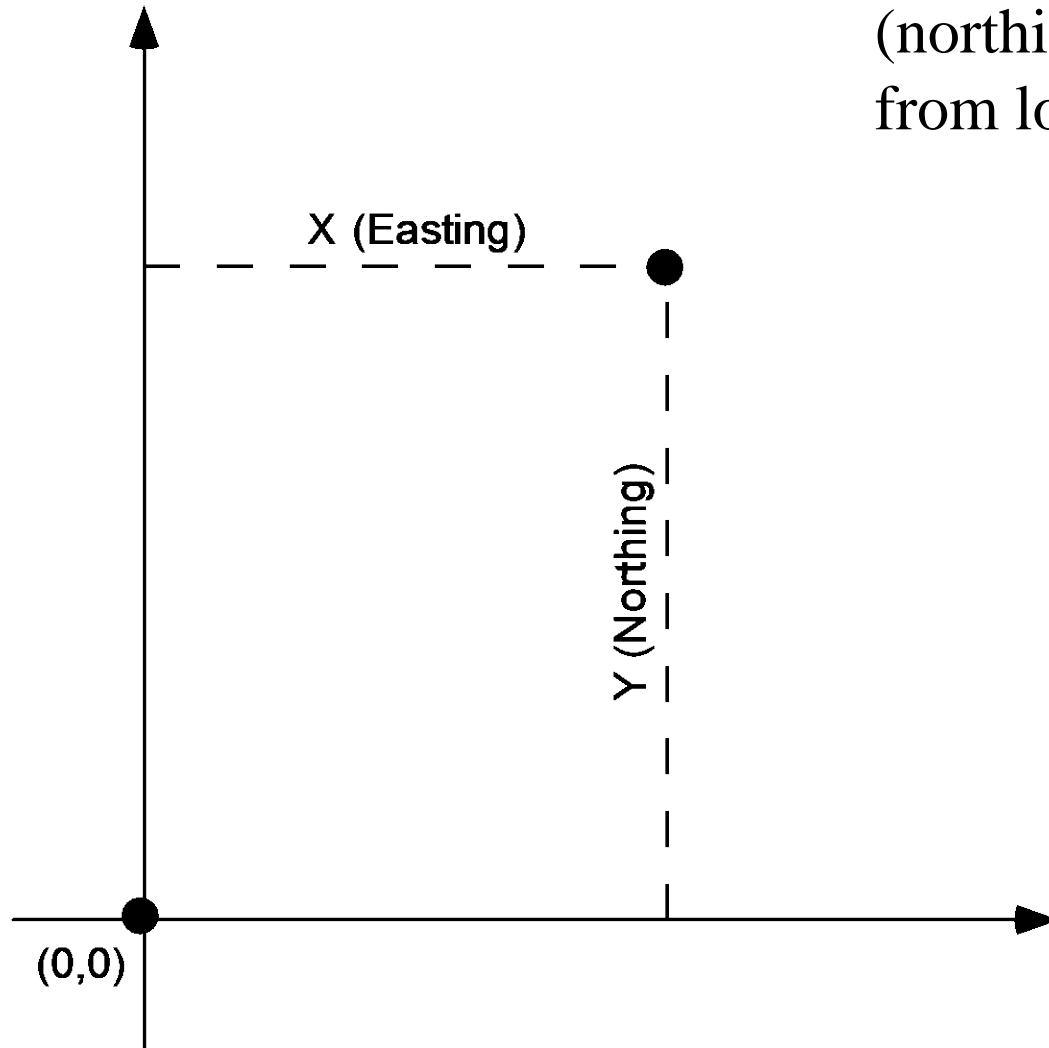
- Data must be in a consistent projection in order to overlay correctly
- Different data sources provide data in different projections
- WMS allows you to convert most data from one projection to another



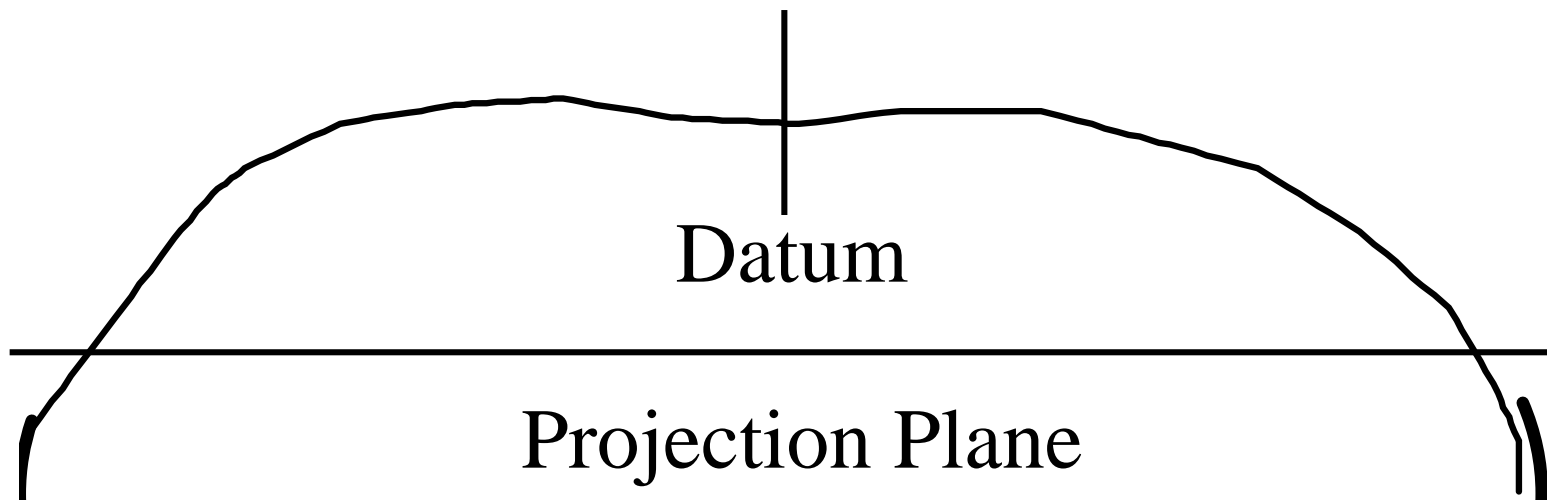
- Latitude and Longitude
  - Spherical Coordinates
  - Geographic Coordinates
  - Latitude measured from the Equator
  - Longitude measured from Prime Meridian
- Fit earth well
- Difficult to get distances and areas



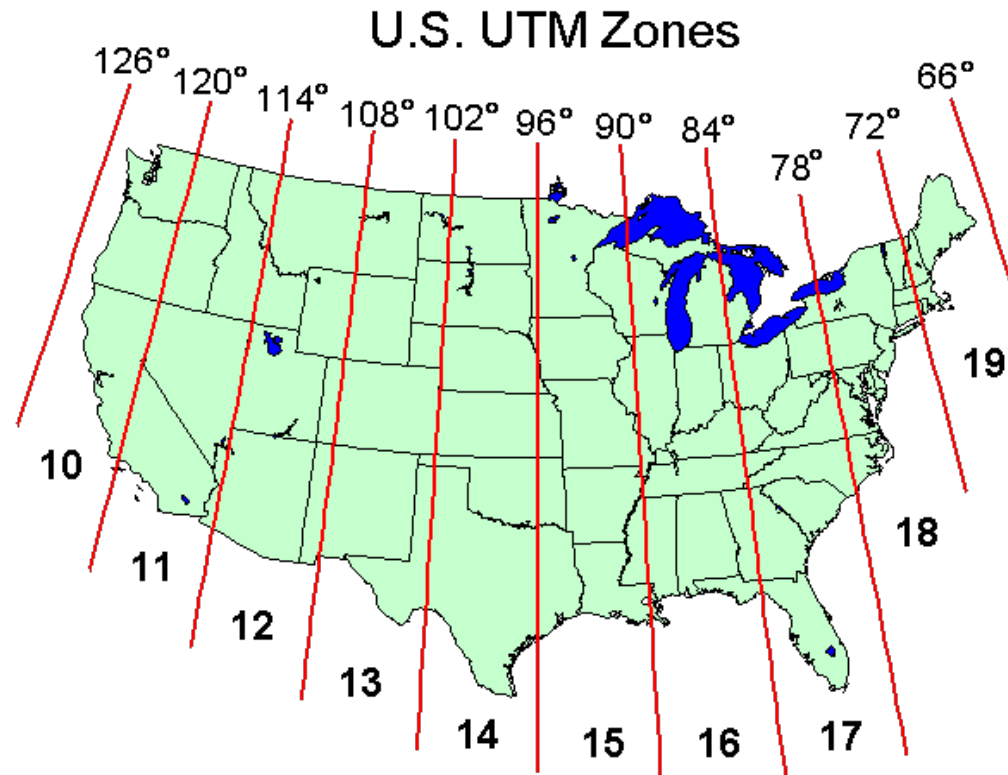
- X (easting) and Y (northing) distance from local origin



# Ellipsoidal Representation of Earth Surface

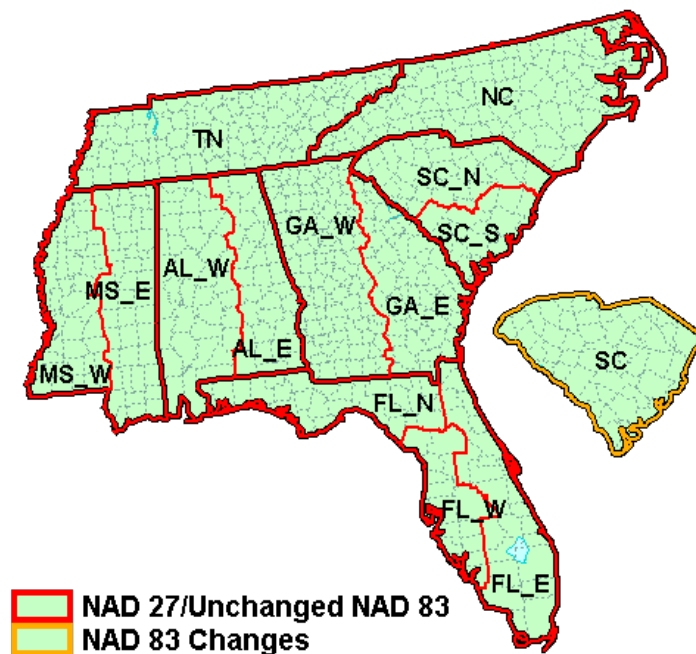
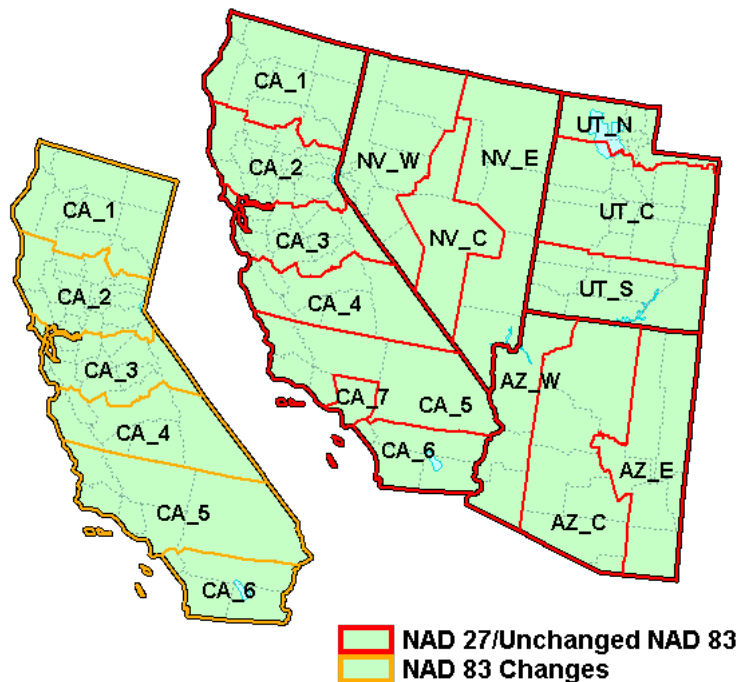


- Universal Transverse Mercator
  - World divided into 60 zones, 6 degrees longitude each

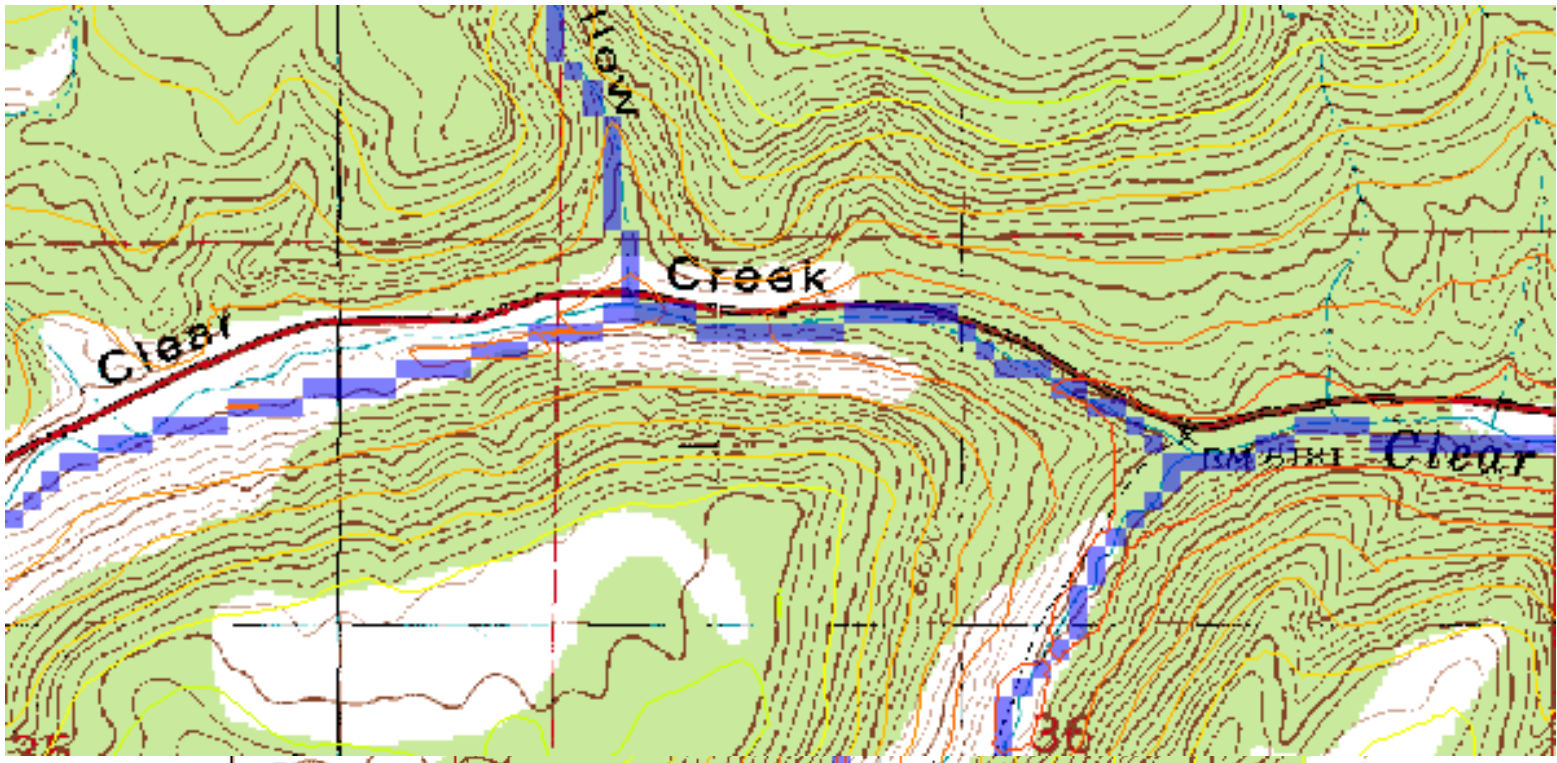




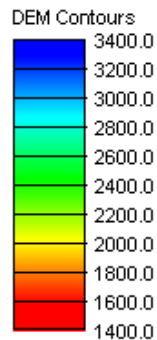
- Commonly used in the U.S.
- XY values defined uniquely in each zone
- Conversion required to move between zones



- Different UTM Systems
  - Image is in UTM NAD 83, DEM in UTM NAD 27



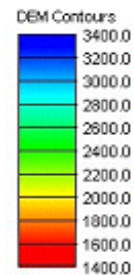
- DEM in one projection and Land Use in another
  - Data come in various projections
  - All data have to be converted to common projection



DEM (UTM)

Land Use (State Plane)

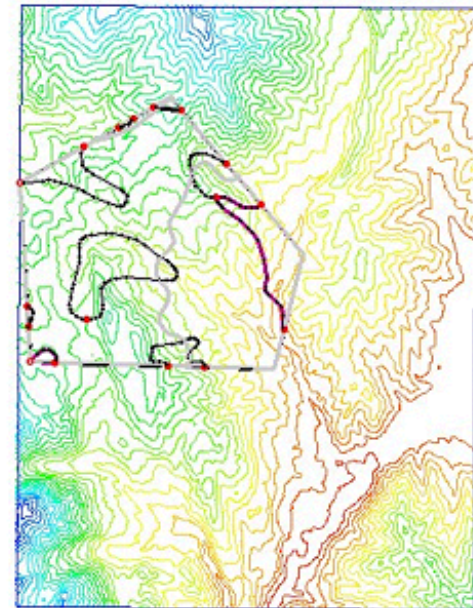
Soils (Geographic)



All in UTM

447105 , 4483190

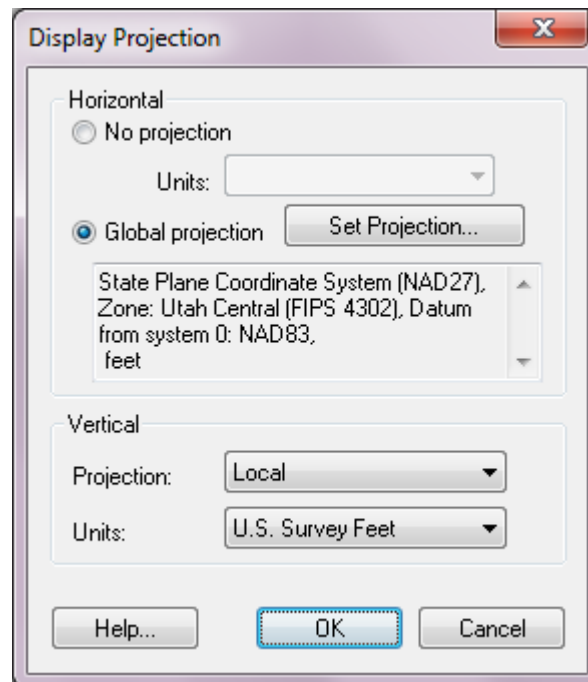
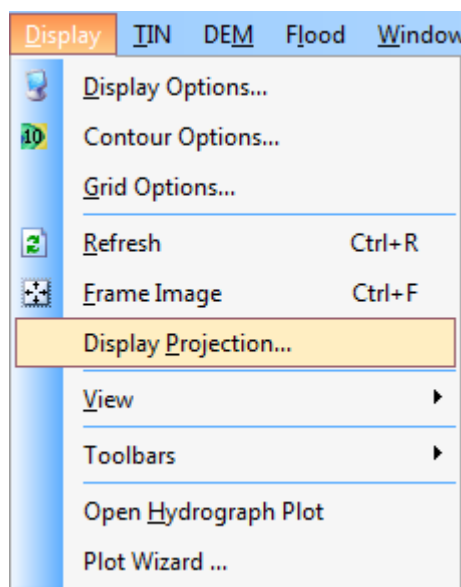
457550 , 4483135



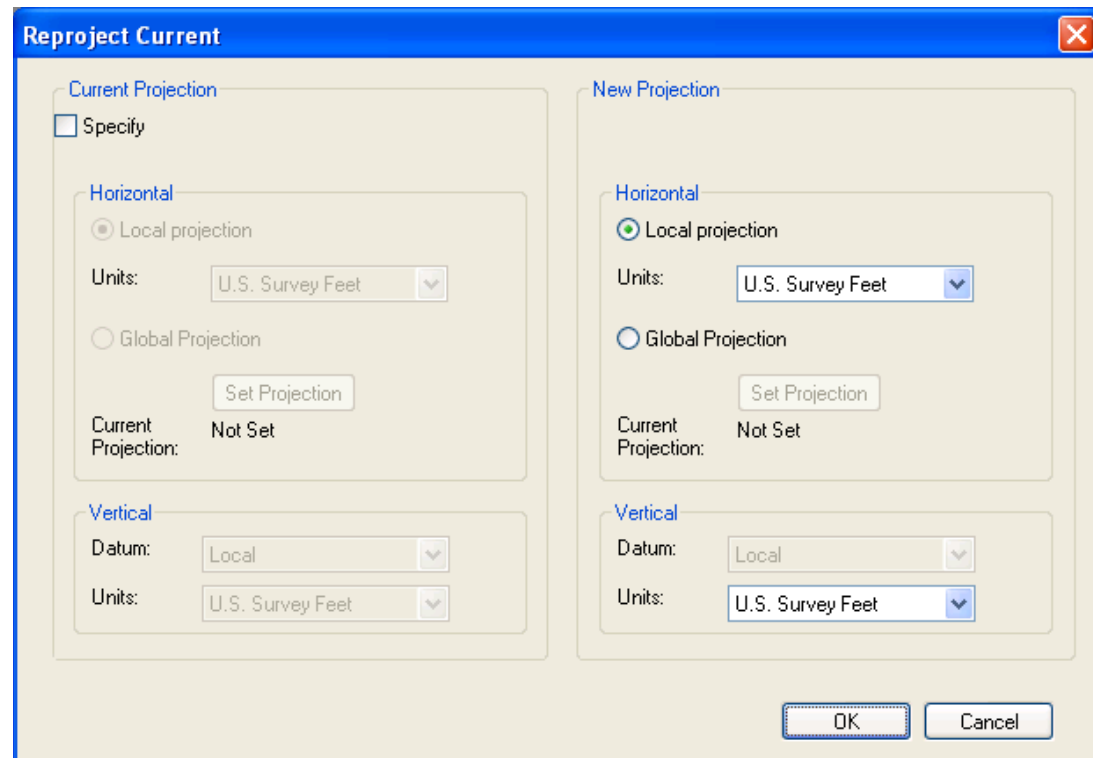
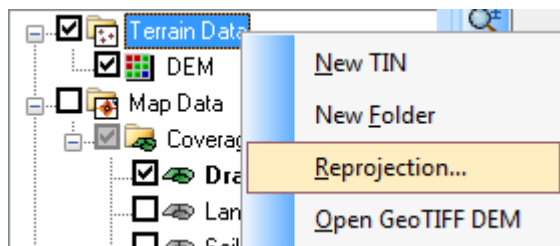
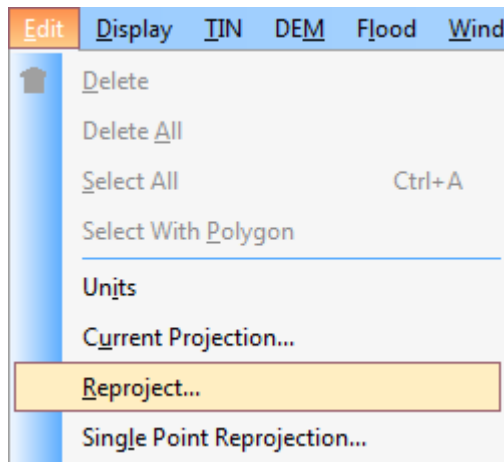
447015 , 4469365

457520 , 4469305

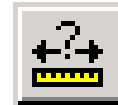
- It isn't enough to have the data, you also need know the projection
- Set the Display Projection before reading or creating data
- If you don't set the display projection, the data may not be displayed in the correct projection



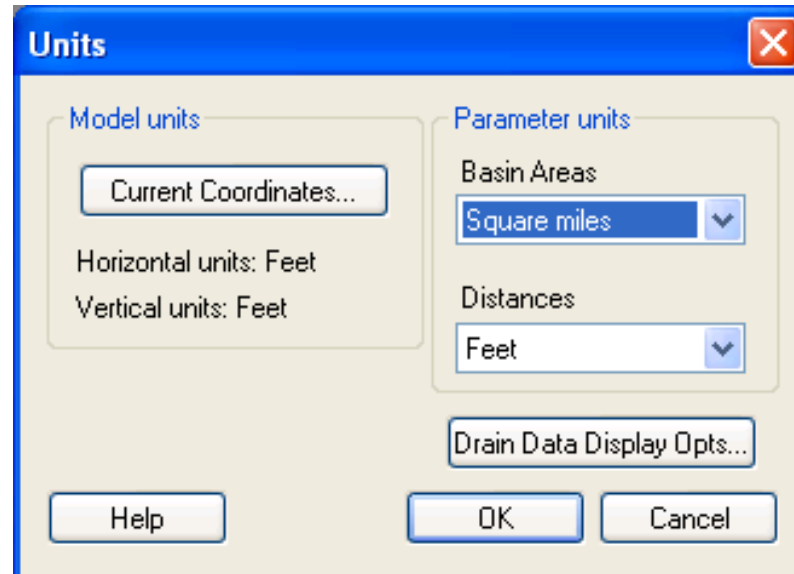
- Specify Projection to Convert To
  - Globally
  - By data object from Tree







- Measurement Tool
- Calculations of Watershed/Stream Geometric Parameters
- Lengths/Areas of Feature Objects



**Reproject Single Point** ✕

**Convert From**

**Horizontal**

☒ Local projection

Units:

☐ Global Projection

Current Projection: Not Set

**Convert To**

**Horizontal**

☒ Local projection

Units:

☐ Global Projection

Current Projection: Not Set

**Vertical**

Datum:

Units:

**Vertical**

Datum:

Units:

**Enter Coordinates:**

X:

Y:

Z:

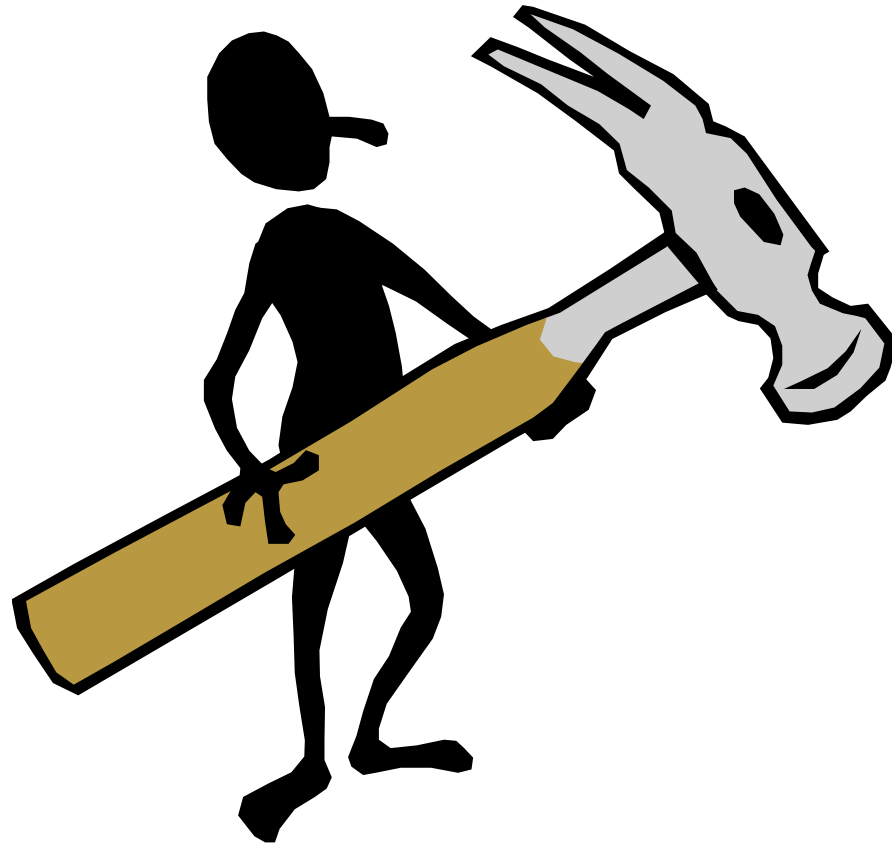
**New Coordinates:**

??

??

??

☐ Create Feature Point



- Objectives

- Learn basic structure of image files
- Understand how images are geo-referenced
- Learn Different projections
- Know how to set the projection in WMS and how to change from one system to another

- Applications

