Week 6

NREM 446/546
Week 6, 2012

Reading assignment: Instructor handout on UTM projections and State Plane Coordinate system.
http://www.lic.wisc.edu/metadata/metaprim.htm

Data Documentation (Metadata) Standards – instructor handout

Material presented this week contributes to the accomplishment of the following course goals:

Goal 2: Be able to plan and conduct a data acquisition session
Goal 7: Be able to construct a map which successfully communicates the desired information to the user.

Information obtained this week will help you further understand map projections and coordinate systems. You will be introduced to the concept of metadata, and you will practice making a basic map using Pathfinder Office.

After studying class notes and reading assignments, participating in class discussions, and conducting lab. 6, you should be able to:

Describe in detail the characteristics of
   Universal Transverse Mercator projection
   State Plane Coordinate System

Describe the kinds of information you might need to know about a digital data set to determine whether it will fit your data needs.

Be able to list and describe the major and minor sections of the Content Standards for Digital Geospatial Metadata (CSDGM)

Post-process GPS data

Construct a basic map using Pathfinder Office software.
More About UTM…

Universal Transverse Mercator – UTM

- Developed by US Army Corps Eng. & Defense Mapping Agency (DMA) in 1947
  - Originally used Clarke 1866 ellipsoid used for the U.S. (International Ellipsoid everywhere else).
  - Now we use WGS84 or GRS80 ellipsoids

- UTM solved problematic mapping issues that arose during WWII
  - Calculating distance between 2 points on WWII maps (conformal grids) could be performed more easily in the field (using the Pythagorean theorem) than was possible using the trigonometric formulas required under the graticule-based system of LAT and LON.

- 1940, <10% of world mapped @ sufficient detail for even the most basic requirements need for pilot charts.

- During WWII, U.S. Air Force photographed vast areas of the world providing reconnaissance maps that were then used as basis for aeronautical charts.

- However, there was still not a sufficiently detailed projection system for global mapping efforts ➔ UTM
UTM - Universal Transverse Mercator

• Divides world into 60 zones (6° Lon. Wide) starting at 180° W Lon (180°-174° W = zone 1)
• Each zone has a line down its center called the Central Meridian (CM)
• CM has a value of 500,000 meters east (from west edge of superimposed GRID)
• West & East from the CM in each zone, lines parallel to CM are placed 1000m apart
• North from the Equator, lines parallel to the Equator are placed 1000m apart
• Together, these lines make up the UTM grid between: from 80° S Lat to 84° N Lat:
  1,000,000m wide (X = eastings) 10,000,000m high (Y = northings)
• Because all zone CM’s converge at the N-pole → Neighboring UTM grid zones increasingly sidelap northward from the Equator.
UTM – Side Lap & E-W Extent

Each UTM Zone = 6° wide

Each UTM Grid = 1,000,000 m wide → But, theoretically zones are only 666,720 m wide

• 1° Lon at Equator = 60 nautical miles (NM)

• 1 NM = 1,852 meters

• 6° * 60 NM = 360 NM wide

• 360 NM * \(\frac{1,852 \text{ m}}{1 \text{ NM}}\) = 666,720 m

• 666,720 m < 1,000,000 m

• Either side of CM = 333,360 m wide
  • UTM GRID ORIGIN → 0m E, 0m N
  • Actual UTM ZONE-to-ZONE sidelap @ Equator → 166,640m

• Why have overlap? Basically for convenience
  • if AOI falls outside the 6° degree LON Zone there is enough GRID Zone buffer so you can still use one UTM Zone’s coordinates.
UTM – Side Lap & E-W Extent

- Along each north/south grid line, the scale factor is constant, but varies in the east-west direction.
- **Secant intersections** at two lines 180 km on either side of Central Meridian.
- Effectively reduces the amount of scale change across the entire zone.
- Features mapped between 180 km east and west of the central meridian are slightly compressed (SF < 1) while those outside the two lines are slightly stretched (SF > 1).
- Scale error does not exceed 0.1 percent within each zone
- For all practical purposes, UTM maps are used as if the scale were constant over the entire zone. UTM creates a map that:
  1) Conformal within the zone
  2) Minimal distortion within the zone
  3) Local angles are true
Wisconsin DNR developed the **Wisconsin Transverse Mercator (WTM)** projection and coordinate system to avoid splitting the state into two UTM zones.

- Uses the Zone 15-16 boundary meridian and the WTM Central Meridian (CM)
- Wisconsin Transverse Mercator (WTM) – Sometimes called UTM zone 15 ½

### WTM Projection Parameters

<table>
<thead>
<tr>
<th>WTM 27</th>
<th>WTM 83</th>
</tr>
</thead>
<tbody>
<tr>
<td>Projection</td>
<td>Transverse Mercator</td>
</tr>
<tr>
<td>Scale factor at CM</td>
<td>0.9996</td>
</tr>
<tr>
<td>CM</td>
<td>-90°</td>
</tr>
<tr>
<td>Latitude of origin</td>
<td>0°</td>
</tr>
<tr>
<td>False Eastings</td>
<td>500,000 m</td>
</tr>
<tr>
<td>False Northings</td>
<td>-4,500,000 m</td>
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</table>
State Plane Coordinate System (SPCS)

SPCS – Set of 124 geographic zones or coordinate systems designed for specific regions of the United States. Each has a unique ID code (e.g., IA north = 1401, IA south = 1402).

Developed in the 1930’s by the Coast & National Geodetic Survey in response to local needs. NAD27 had just been published & people were having trouble using Lat/Lon in computations.

SPCS popularity due to two factors:
• 1) Uses a simple Cartesian coordinate system to specify locations rather than a more complex spherical coordinate system (Lat/Lon). Curvature of the Earth ignored enabling "plane surveying" methods → speeds up and simplifies calculations.
• 2) SPCS is highly accurate within each zone (error < 1:10,000)

Outside a specific SPCS zone accuracy rapidly declines, thus the system is not useful for regional or national mapping.

Most SPSC zones TM or LCC → based on State’s shape

Panhandle of Alaska (diagonal) uses an Oblique Mercator projection (X and Y error minimized)
SPCS - Multiple Zones

Ideas was to design a CONFORMAL mapping system for whole U.S.
...Wanted max. scale distortion < 1 part in 10,000 \( \text{(limit of surveying accuracy in 1933)} \)

• Which required zones to be \(~158 \text{ miles wide (Max.)}\)
• To achieve this, had to chop up U.S. into 124 zones or FIPS \( \text{(Fed. Info. Processing Std.)} \)
  • Each has own CM & Standard Parallels (2)

Originally, SPCS’s used NAD27 datum in U.S. survey feet
  • \( U.S. \text{ survey foot} = \frac{1200}{3937} \text{ m} \rightarrow 0.3048006096 \text{ m} \)
  • 1 regular foot = 0.99999803149994 survey feet

Now, SPCS’s use NAD83 in meters \( \text{(an attempt to kill the U.S. survey foot!!)} \)

In the past (80-90’s), if one didn’t have METADATA for a GIS coverage file, you could tell which NAD(27 or 83) was used by the units (ft vs. m). Not at all safe to assume anymore.
IOWA’s State Plane Coordinate System

2 ZONES – Both are base on Lambert Conformal Conic with NAD83 datum

- North zone
  - Standard parallels: $42^\circ 04' 00''$ and $43^\circ 16' 00''$ North Latitude
  - Origin: 1,500,000m X, 1,000,000m Y $\Rightarrow$ -93° 30’ 00” LON and 41° 30’ 00” LAT

- South zone
  - Standard parallels: $40^\circ 37' 00''$ and $41^\circ 47' 00''$ North Latitude
  - Origin: 500,000m X, 0m Y $\Rightarrow$ intersection of: -93° 30’ 00” LON & 40° 00’ 00” LAT
METADATA – Data About Spatial Data

Make a list of the information you would want to know about a data set if you were to borrow or purchase that data set for use in your project....

Or, if you were going to give data that you generated/made to someone else that is not familiar with it.

On this, think...Light Pole Data
Light Pole data:
Date Produced: 
Contact Person: 
Purpose of Data: 
Abstract: 
Data Published: 
Publishing Institution: 
Online Access: 
General location of the map extent: 
Bounding Coordinates: 
Map Projection: 
Projection Parameters: 
Ellipsoid Parameters: 
Measurement Units: 
Model of GPS used: 
Horizontal Accuracy HDOP: 
Number of point in file: 
Description of the point attributes: 
Number of GPS positions collected per point: 
Differentially Corrected: 
Base Station Used for Correction: 

Data Format: 
Suggested Citation: 
BLA...BLA...BLA...
Etc....Etc....Etc....

WHY the heck do we need all this stuff ???
“Software for creating, editing, and managing metadata should be a standard feature built into any GIS system—not something 'extra.'” —Jack Dangermond

- With metadata support, data producers can publish information about data, and data consumers can search for the data they need.
- Because spatial data is the fuel of a GIS, it is important to know if the data will meet your (the user) needs.
  - Scale (1:15,840, 1:24,000, 1:50,000, 1:250,000...)
  - Classification resolution (Anderson II or III, ssurgo v.s statsgo soils, stream order data, watershed data)
  - Minimum mapping unit (polygon size {vector}, patch size {raster})
  - Vintage/currency → may want to use newest data possible
  - Data format (TIF, IMG, SHP, GRID, LAN, ArcInfo COV)
- Data users need metadata to locate appropriate data sets
- Metadata provides information about the data available within an organization or from:
  - Catalog services,
  - Clearinghouses
  - Other external sources
- Metadata not only helps find data, but once data has been found, it also tells how to interpret & use data
  - e.g., National Wetlands Inventory’s moisture modifier codes
- Publishing metadata facilitates data sharing. Sharing data between organizations stimulates
  - Cooperation
  - Coordinated effort
  - Integrated approach to spatially related policy issues
Metadata and GIS Management

Metadata is also important for maintaining an organization's investment in spatial data

- Provides an inventory of data sets (GoogleEarth → BIG data)
- Helps determine & maintain the value of data
- Helps one determine reliability & currency of data
- Supports decision making (e.g., US FS & US FWS inventory need)
- Documents possible legal issues (e.g., FIA or land parcel data etc.)
- Helps verify data accuracy to:
  - support good decision making
  - cost savings
- Helps determine budgets by providing a clearer understanding of when or if data needs to be updated or repurchased
  - TIGER roads data ... constantly being updated
  - Lidar data
What is Metadata?

It is a **summary document** providing content, quality, type, creation, & spatial information about a data set.

Can be stored in any format:

- Text file
- Extensible Markup Language (XML) -or- Standard Generalized Markup Language (SGML)
- Database record (Access or Excel)

**Good Example: National Wetlands Inventory’s metadata for Minnesota**

[http://www.mngeo.state.mn.us/chouse/metadata/nwi.html](http://www.mngeo.state.mn.us/chouse/metadata/nwi.html)

<table>
<thead>
<tr>
<th>METADATA SUMMARY</th>
<th>FULL METADATA</th>
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<tbody>
<tr>
<td>Originator</td>
<td>3) Native Data Environment</td>
</tr>
<tr>
<td>Abstract</td>
<td>Geographic Reference for tabular data</td>
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<tr>
<td>Browse Graphic</td>
<td>Spatial Objective Type</td>
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<tr>
<td>Time Period of Content Date</td>
<td>Tiling Scheme</td>
</tr>
<tr>
<td>Currentness Reference</td>
<td>4) Horizontal Coordinate Scheme</td>
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<tr>
<td>Access Constraints</td>
<td>Ellipsoid</td>
</tr>
<tr>
<td>Use Constraints</td>
<td>Horizontal Datum</td>
</tr>
<tr>
<td>Distributor Organization</td>
<td>Horizontal Units</td>
</tr>
<tr>
<td>Ordering Instructions</td>
<td>Distance Resolution</td>
</tr>
<tr>
<td>Online Linkage</td>
<td>Altitude Datum</td>
</tr>
</tbody>
</table>

Go to Section:
1. Identification Information
2. Data Quality Information
3. Spatial Data Organization Information
4. Spatial Reference Information
5. Entity and Attribute Information
6. Distribution Information
7. Metadata Reference Information

5) Entity & Attribute Overview
   - Entity & Attribute Detailed Citation

6) Publisher
   - Publication Date
   - ETC ETC ETC.....BLA BLA BLA.....
GROUP = L1_METADATA_FILE
GROUP = METADATA_FILE_INFO
  ORIGIN = "Image courtesy of the U.S. Geological Survey"
  REQUEST_ID = "0101202012096_00001"
  PRODUCT_CREATION_TIME = 2012-02-04T14:53:12Z
  STATION_ID = "EDC"
  LANDSAT5_XEAND = "1"
  GROUND_STATION = "KIS"
  LPS_PROCESSOR_NUMBER = 0
  DATERANGE_CONTACT_PERIOD = "112210"
  SUBINTERVAL_NUMBER = "01"
END_GROUP = METADATA_FILE_INFO
GROUP = PRODUCT_METADATA
  PRODUCT_TYPE = "LIT"
  ELEVATION_SOURCE = "GLS2000"
  PROCESSING_SOFTWARE = "LPSG_11.6.0"
  EPHMERIS_TYPE = "DEFINITIVE"
  SPACECRAFT_ID = "Landsat5"
  SENSOR_ID = "TM"
  SENSOR_MODE = "BUMPER"
  ACQUISITION_DATE = 2011-05-02
  SCENE_CENTER_SCAN_TIME = 10:31:28.095088023
  WRS_PATH = 200
  STARTING_ROW = 13
  ENDING_ROW = 13
  BAND_COMBINATION = "1234567"
  PRODUCT_UL_CORNER_LAT = 67.9662065
  PRODUCT_UL_CORNER_LON = 8.9967479
  PRODUCT_UR_CORNER_LAT = 68.0754071
  PRODUCT_UR_CORNER_LON = 15.2903866
  PRODUCT_LL_CORNER_LAT = 65.7571029
  PRODUCT_LL_CORNER_LON = 9.5162288
  PRODUCT_LR_CORNER_LAT = 65.8552366
  PRODUCT_LR_CORNER_LON = 15.2650975
  PRODUCT_UL_CORNER_MAPX = 249000.000
  PRODUCT_UL_CORNER_MAPY = 7551300.000
  PRODUCT_UR_CORNER_MAPX = 512100.000
  PRODUCT_UR_CORNER_MAPY = 7551300.000
  PRODUCT_LL_CORNER_MAPX = 249000.000
  PRODUCT_LL_CORNER_MAPY = 7303800.000
  PRODUCT_LR_CORNER_MAPX = 512100.000
  PRODUCT_LR_CORNER_MAPY = 7303800.000
  PRODUCT_SAMPLES_REF = 8771
  PRODUCT_LINES_REF = 8251
  PRODUCT_SAMPLES_THM = 8771
  PRODUCT_LINES_THM = 8251
END_GROUP = PRODUCT_METADATA
GROUP = CORRECTIONS_APPLIED
GROUP = PROJECTION_PARAMETERS
  REFERENCE_DATUM = "WGS84"
  REFERENCE_ELLIPSOID = "WGS84"
  GRID_CELL_SIZE_THM = 30.000
  GRID_CELL_SIZE_REF = 30.000
  ORIENTATION = "NUP"
  RESAMPLING_OPTION = "CC"
  MAP_PROJECTION = "UTM"
END_GROUP = PROJECTION_PARAMETERS
GROUP = UTM_PARAMETERS
  ZONE_NUMBER = 33
END_GROUP = UTM_PARAMETERS
GROUP = GEOMETRIC_VERIFY
  UL_QUAD_RMSE = 0.0
  UR_QUAD_RMSE = 0.0
  LR_QUAD_RMSE = 0.0
  LL_QUAD_RMSE = 0.0
  SCENE_RMSE = 0.0
END_GROUP = GEOMETRIC_VERIFY
END_GROUP = L1_METADATA_FILE
END
Metadata Standards

Federal Geographic Data Committee (FGDC)

Is the U.S. Government entity in charge of establishing...

- **Content Standards for Digital Geospatial Metadata (CSDGM)**
  - They specify the *content & format* for metadata
  - Ensures that metadata are clearly described....
  - Which enables their proper & effective use within and organization
  - Ensures description of data in a standard manner
  - Facilitates easier evaluation of data & transfer to other organizations

- **CSDGM** Standard Elements – exhaustive list → over 330 elements

- Flexible – may be extended to include new elements & categories of info in the future

- **CSDGM** elements in general...Information about the spatial data
  - Descriptions or linkages to other elements
    - Standardized *long & short* names
    - Specific order with *hierarchical numbering system*...
      - *Ex: 1.5.1.1 West Bounding Coordinate (westbc)*— western-most coordinate of the limit of coverage expressed in longitude...
        - 1 = basic ID info
        - 1.5 = info on spatial domain
        - 1.5.1 = bounding coordinates
        - 1.5.1.1 = western-most bounding coordinate
10 basic types of info in CSDGM:

**Major sections of the CSDGM**  
(From: [http://www.fgdc.gov/metadata/csdgm/](http://www.fgdc.gov/metadata/csdgm/))

**Identification Information**  
data set title, area covered, keywords, purpose, abstract, access and use restrictions

**Data Quality Information**  
horizontal and vertical accuracy assessment, data set completeness and lineage

**Spatial Data Organization Information**  
raster, vector, or an indirect (e.g. address) link to location

**Spatial Reference Information**  
lat/long, coordinate system, or map projection

**Entity and Attribute Information**  
definitions of the attributes of the data set

**Distribution Information**  
distributor, file format of data, off-line media types, on-line link to data, fees

**Metadata Reference Information**  
who created the metadata and when

**Minor sections of the CSDGM**  
CSDGM defines three 'floating' minor sections

**Citation Information**  
originator, title, publication date, publisher

**Time Period Information**  
single date, multiple dates, range of dates

**Contact Information**  
contact person and/or organization, address, phone, email
Postscript on CSDGM

- **CSDGM** is a content standard, but does not specify metadata format

- As long as the data elements are...
  - Included
  - Properly numbered
  - Identified with correct values describing the data...

- ...Then, the metadata are considered *congruent with CSDGM*

- Metadata are often created using *specialized software* – making it easy to:
  - Enter data (reduces redundancy errors) ➔ e.g., ARC Catalog
  - Ensure correct linkages
  - Check for contradictory info or errors

- Metadata most easily produced when integrated into data production workflow ....*Pain in the butt to do it afterward ➔ memories fade*

- Although not all organizations in U.S. adhere to **CSDGM**, most record & organize a description & other important info about their data

- Many organizations consider **Geospatial data incomplete if lacks metadata**
Example of SGML format:

Portion of metadata for 1:100,000 scale DLG

4. Spatial Reference Information:
   4.1 Horizontal Coordinate System Definition:
      4.1.2 Planar:
         4.1.2.2 Grid Coordinate System:
            4.1.2.2.1 Grid Coordinate System Name:
               Universal Transverse Mercator
            4.1.2.2.2 Universal Transverse Mercator:
               4.1.2.2.2.1 UTM Zone Number: 10-19
         4.1.2.4 Planar Coordinate Information:
            4.1.2.4.1 Planar Coordinate Encoding Method:
               coordinate pair
            4.1.2.4.2 Coordinate Representation:
               4.1.2.4.2.1 Abscissa Resolution: 2.54
               4.1.2.4.2.2 Ordinate Resolution: 2.54
            4.1.2.4.4 Planar Distance Units: meters
      4.1.4 Geodetic Model:
         4.1.4.1 Horizontal Datum Name: North American Datum 1927
         4.1.4.2 Ellipsoid Name: Clark 1866
         4.1.4.3 Semi-major Axis: 6378206.4
         4.1.4.4 Denominator of Flattening Ratio: 294.98
   4.2 Vertical Coordinate System Definition:
      4.2.1 Altitude System Definition:
         4.2.1.1 Altitude Datum Name:
            National Geodetic Vertical Datum of 1929
         4.2.1.2 Altitude Resolution: 1
         4.2.1.3 Altitude Distance Units: feet or meters
         4.2.1.4 Altitude Encoding Method: attribute values
      4.2.2 Depth System Definition:
         4.2.2.1 Depth Datum Name: Mean lower low water
         4.2.2.2 Depth Resolution: 1
         4.2.2.3 Depth Distance Units: meters or feet
         4.2.2.4 Depth Encoding Method: attribute values
ArcCatalog Metadata...

Federal Geographic Data Committee
EPA’s Metadata Software...

A program called the Three Tab Editor, an extension to the ArcGIS ArcCatalog framework developed by the Coeur d'Alene Tribe, provided the basis for developing the EPA's metadata tool. It simplifies the editing environment by reducing the number of tabs used from seven to three.

At version 2.0, the EPA Metadata Editor features user interface components that follow the structure of the EPA implementation of the FGDC CSDGM and incorporates the use of a spell-checker and an EPA-validation service.
## Metadata Software Comparisons

### Federal Geographic Data Committee

<table>
<thead>
<tr>
<th>Software Name</th>
<th>Company/ Website</th>
<th>Description</th>
<th>Technical Notes</th>
<th>Profiles/ Extensions</th>
<th>Comments</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>ArcCatalog 9.0</td>
<td>ESRI <a href="http://www.esri.com">www.esri.com</a></td>
<td>FGDC-compliant metadata editor with stylishness for various formats (FGDC, XML, etc.) Automated creation &amp; update of spatial metadata elements &amp; list of attributes. Stored as XML, flat file. Can create custom editor &amp; stylesheet. Advanced tools &amp; customization available.</td>
<td>Runs on MS Windows NT 4.0 w/Service Pack 9a, Windows 2000, or Windows XP Recommended system requirements: Pentium, 650 MHz or higher, 256 MB RAM</td>
<td>None</td>
<td>Intuitive windows GUI interface, good built-in help. If you're already using ArcGIS it is very convenient to use. Use of advanced synchronization tools is work around to create template with an existing metadata record. To create metadata record with biological data profile, start with ArcCatalog, export import to TKME or SMMS.</td>
<td>Integrate in ArcGIS 9.1 Suite. Discounts may apply for federal, state and academic institutions with many seats purchased.</td>
</tr>
<tr>
<td>ArcView 3.x Extension</td>
<td>Created by NOAA <a href="http://csc.ncei.noaa.gov/metadata-download.html">http://csc.ncei.noaa.gov/metadata-download.html</a></td>
<td>Has a series of user-friendly tools to create FGDC metadata. Metadata records are stored as dbf files and the user can import/reuse portions such as citations, contacts, keywords, and attribute domain values. Automatically creates metadata for spatial metadata elements (reprojection, etc.). Creates metadata as text or html</td>
<td>Runs with ArcView 3.x</td>
<td>None</td>
<td>Intuitive windows GUI interface, includes help and examples for each metadata section. Good option for programs that have only ArcView 3.x and do not have the budget to purchase additional metadata software.</td>
<td>FREE</td>
</tr>
<tr>
<td>Metadata Tool</td>
<td>Created by US Forest Service <a href="http://nps.fs.fed.us/pubs/npspubs.asm?year=2017">http://nps.fs.fed.us/pubs/npspubs.asm?year=2017</a></td>
<td>Standalone tool for creating FGDC standard metadata with NBS BDP</td>
<td>Standalone</td>
<td>None</td>
<td>Current version does not reuse Sections 8.10 may be added in next update.</td>
<td>FREE</td>
</tr>
<tr>
<td>SMMS Spatial Metadata</td>
<td>Intergraph <a href="http://intergraph.com/primus">http://intergraph.com/primus</a></td>
<td>FGDC-compliant metadata editor. Can associate a SMMS metadata record with the actual GIS data layer it describes. Automated capture of spatial metadata elements and list of attributes. Metadata publishing. Can create metadata templates and keywords lists, and includes a database so it can re-use components. Can create user-defined metadata fields</td>
<td>Runs on MS Windows NT or Windows 2000, uses MS Access, SQL Server, or Oracle backend</td>
<td>Biological Data Profile</td>
<td>Intuitive windows GUI interface, good built-in help with sample metadata. Great ability to create and re-use templates &amp; admin components such as contacts and citations. SMMS is currently being used in the USGS FGDC/ NDI metadata training workshops.</td>
<td>Single copy=$600, Volume Discount = $300. Demo evaluation copy available on Intergraph's website. 20% off for NDI partners. Educational grant program</td>
</tr>
<tr>
<td>Metadata Software Comparisons</td>
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<tr>
<td><strong>Metadata Parser</strong></td>
<td><strong>Metadata Quality Control</strong></td>
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<tr>
<td>Metascribe</td>
<td>Metadata quality control and output configuration tool. Compares formal metadata, checking the syntax against the FGDC CSDGM and generating output suitable for viewing with a web browser or text editor.</td>
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<tr>
<td>NOAA - <a href="http://ncc.nos.navy.mil/metadata/metascr.html">http://ncc.nos.navy.mil/metadata/metascr.html</a></td>
<td>USGS software. Fairly comprehensive instructions available online, and software author (Peter Schweitzer) very accessible to answer questions.</td>
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<td>Requires machine capable of running internet browser such as Explorer or Firefox.</td>
<td>DED-based software. Fairly comprehensive instructions available online, and software author (Peter Schweitzer) very accessible to answer questions.</td>
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<tr>
<td><strong>MPBatch</strong></td>
<td><strong>CNS and MP Batch</strong></td>
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<tr>
<td>Integrgraph - <a href="http://nigsupport.integrgraph.com/tools.asp">http://nigsupport.integrgraph.com/tools.asp</a></td>
<td>CNS and MP Batch is a Win32 program that runs the CNS and MP for those who don't like DOS.</td>
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<tr>
<td>VERY helpful tool to convert metadata into correct format.</td>
<td>DED-based software. Fairly comprehensive instructions available online, and software author (Peter Schweitzer) very accessible to answer questions.</td>
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<tr>
<td><strong>CNS and MP Batch</strong></td>
<td><strong>Metadata Parser</strong></td>
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<td>CNS and MP Batch is a Win32 program that runs the CNS and MP for those who don't like DOS.</td>
<td>Metadata quality control and output configuration tool. Compares formal metadata, checking the syntax against the FGDC CSDGM and generating output suitable for viewing with a web browser or text editor.</td>
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<td>VERY helpful tool to convert metadata into correct format.</td>
<td>USGS software. Fairly comprehensive instructions available online, and software author (Peter Schweitzer) very accessible to answer questions.</td>
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**Editors for Formal Metadata**

**TKME**
- Editor for formal metadata that conforms to the FGDC CSDGM. Closely aligned with MP (see list); multilingual can be configured for French, Spanish and Indonesian element names.
- TKME is capable of creating remote sensing metadata. The capability is not readily discoverable until you drill down into the ‘using config files’ then click on using a profile.

**USGS**
- Editor for formal metadata that conforms to the FGDC CSDGM. Closely aligned with MP (see list); multilingual can be configured for French, Spanish and Indonesian element names.
- Initially takes more effort to figure out how to use the software (steeper learning curve) since it is not a Windows OLE application. Once you get the hang of TKME it is easy to work with and since it has a large window in some ways it is better for editing long text fields.
- Suggest using with hard copy of FGDC standard to help keep track of what elements are and what the required elements are. Was easy to able to import metadata file originally created in ESRITabCatalog and use TKME to add the biological data profile metadata elements.
- DOS-based software. Fairly comprehensive instructions available online, and software author (Peter Schweitzer) very accessible to answer questions.
This site provides free access to Iowa geographic map data through an on-line map viewer and through GIS web map server (WMS) connections. The site was developed by the Iowa State University Geographic Information Systems Support and Research Facility in cooperation with the USDA Natural Resources Conservation Service and the Massachusetts Institute of Technology. The site was first launched in March 1999. Available map layers are shown below.

Open the Iowa Geographic Map Server Viewer [Here].
Open ArcGIS Explorer Online map viewer [Here].
Open ArcGIS Explorer Desktop project [Here].
Open ArcGIS Explorer Desktop project with 2007-2010 spring 2 ft resolution aerial photos [Here].

[New] 1970s USDA Aerial Photos. This imagery is provided through a project funded by the Iowa DNR in cooperation with the USDA Natural Resources Conservation Service, and ISU GIS Facility. [Metadata] [Status map].

[New] 2011 orthophotos. USDA National Agriculture Imagery Program (NAIP) natural color ortho photo mosaics from aerial photos taken in July-September 2011. The maximum resolution of this imagery is 1 meter. [Status map].

[New] 1980s Color Infrared Aerial Photos. This imagery is provided through a project funded by the Iowa DNR in cooperation with the ISU GIS Facility. [Metadata] [Status map].

2010 orthophotos. USDA National Agriculture Imagery Program (NAIP) natural color and color infrared ortho photo mosaics from aerial photos taken in August-October 2010. The maximum resolution of this imagery is 1 meter. [Status map].

2010 Eastern Iowa high resolution orthophotos. Natural color and color infrared ortho photo mosaics from aerial photos taken in March-May 2010. The project area covers a 41 county area of eastern Iowa. [Status map].

2000 Southwest Iowa high resolution orthophotos. Natural color and color infrared ortho photo mosaics from aerial photos taken in March-May 2009. The project area covers a 41 county area of southwest and central Iowa. [Status map].

Color Hillshade from 30-meter digital elevation model. Colors represent elevation values from statewide DEM. A gray-scale hillshade model was merged with the colored DEM. [Legend] [Status map].

Hillshade maps from 2007-2010 high resolution LiDAR Terrain mapping project. The Iowa DNR, USDA Natural Resources Conservation Service and other partners funded a multi-year project to collect high-resolution LiDAR terrain data for the State of Iowa. These hillshade maps are a derivative product from data collection that was begun in 2007. The maps are produced from 1-meter resolution digital elevation models (DEM) from the LiDAR bare-earth datasets. [More] [Status map].

2005 Orthophotos. USDA National Agriculture Imagery Program (NAIP) natural color ortho photo mosaics from aerial photos taken in August-October 2005. The maximum resolution of this imagery is 1 meter. [More] [Status map].
Data Catalogs & Clearinghouses

Wisconsin’s Land Information Clearinghouse

www.sco.wisc.edu/wisclinc/index.php

Minnesota’s GIS Data Clearinghouse

http://deli.dnr.state.mn.us/
2 Ways to Access Ancillary Info in PFO

1)
2 Ways to Access Ancillary Info in PFO

2)