

GS407/507 GIS Applications in Earth Sciences
End-of-Workshop Project DUE: Friday July 13, 2007

Your job is to compile a complete set of GIS vector map themes, digital elevation models, and DRG's for a select watershed in western Oregon. In addition you will calculate some basic watershed parameters from your GIS compilation.

Student	Assigned Coast Range Watersheds
Cynthia	1. Gales Creek Watershed (Tualatin Basin, Washington County)
Mark	2. Elk River Watershed (Sixes River Basin, Curry County)
Janelle	3. Schooner Creek-Drift Creek Watershed (Siletz-Yaquina Basins, Lincoln County)

Instructions: All final project materials will be included at the end of your portfolio binders. Make sure you organize your final projects by Task No., and clearly label the sections in order of appearance below.

NOTE: All of the map data for Tasks 1 through 8 are available for download in the “Final Project” section of the class web site.

Task 1. Using the Coast Range Watersheds theme from the class website (under the final project section), find all of the subbasins that are contained within your assigned watershed.

Task 2. Identify the County(ies) in which your watershed (and related subbasins) is (are) contained.

Task 3. Identify all of the USGS 7.5-minute quadrangles that contain portions of your watershed.

Task 4. Using ArcView, select your watershed sub-basins from the Coast Range Watershed theme and convert them to a new, stand-alone shape file.

Task 4A. Create a map layout, with name, title, scale, north arrow, legend, etc. Print your new watershed subbasin theme map.

Task 5. Using ArcView, dissolve your sub-basin polygons into one large watershed polygon for your study site.

Task 5A. Create a map layout, with name, title, scale, north arrow, legend, etc. Print your new consolidated watershed boundary theme map.

Task 6. Using ArcView and the 1:24000 State Quadrangle polygon theme from the class web site (under the final project section), select all of the quads that contain your watershed footprint. Convert the selected quadrangles to a new, stand-alone shape file that can be used as an overlay on your watershed footprint.

Task 6A. Create a map layout, with name, title, scale, north arrow, legend, etc. Print your new quadrangle map with watershed footprint overlay.

Task 7. Using ArcView and the “Coast Range Streams” theme from the class web site (under the final project section), clip the stream coverage so that it forms an overlay within your watershed footprint.

Task 7A. Create a map layout, with name, title, scale, north arrow, legend, etc. Print your new watershed footprint theme map with stream pattern overlay.

Task 8. Use the ArcView table manager and your newly created watershed themes to determine the following watershed parameters:

Total Drainage Area (sq. meters)	_____
Total Drainage Area (sq. km)	_____
Total Length of Watershed (sq. km)	_____
Total Width of Watershed (sq. km)	_____
Watershed Length/Width Ratio	_____
Total No. of Subbasins in Watershed	_____
Average Area of Subbasins in Watershed	_____
Total No. of Stream Segments or Tributaries in Watershed	_____
Total No. of First Order Stream Segments	_____
Total No. of Second Order Stream Segments	_____
First Order Stream Frequency (Total No. / Drainage Area)	_____

NOTE: Task 9 involves using web resources to search for GIS data sources and downloading data from external web sites. Suggested links are provided at the bottom of the class web site to get you started, part of this exercise is exploring web resources on your own.

Task 9. For your selected watershed, use the GIS web links on the class web site (plus any others that you may find) to download and assemble the following GIS themes:

USGS DRG (raster)	Soils (vector)	and...
USGS DEM (raster)	Vegetation (vector)	3 relevant map themes of your
Bedrock Geology (vector)	Roads (vector)	choosing (e.g. fish habitat,
City Boundaries (vector)	Streams (vector)	endangered species, trees, etc.)

Parameters:

- 9-1. convert all map themes to UTM meters, Zone 10 North (NAD_1927)
- 9-2. Clip each vector file so that each theme perfectly overlays the watershed boundary footprint.
- 9-3. Using layout with student names, quadrangle name, map theme title, scale, north arrow, legend, print the following and assemble in a neat looking package to include in each of your portfolios:

Printout for each watershed

- | | | |
|-------------------------------------|---------------------|--------------------------|
| A. Quad DRG's | D. Soils on DEM | G. Cities on DRG |
| B. Quad DEM's | E. Bedrock on DRG's | H. Streams on vegetation |
| C. Vegetation with polygons labeled | F. Roads on bedrock | |

And....

- I. Each of your three choice relevant themes overlain on DRG topo base

Task 10. Using the class web site resources and download links, find and assemble all of the Digital Orthophoto Quads for your watershed (Mr. Sid files are the most compact and easiest to use). Question: What projection are the Oregon state 7.5-min quad DOQ's in ? Using layout with student names, quadrangle name, map theme title, scale, north arrow, legend, print the DOQ's to include in each of your portfolios.

Task 11. save and assemble all of your data and project files on a CD to submit with each of your portfolios, respectively

Task 12. Using ArcView Spatial Analyst, your assembled DEM's, and watershed themes, calculate the following watershed parameters:

Minimum Watershed Elevation (feet) _____

Maximum Watershed Elevation (feet) _____

Minimum Slope (decimal degrees) _____

Maximum Slope (decimal degrees) _____

Task 13. Copy/Save/Compile all of your GIS themes, shapefiles, grids, and raster graphics onto a CD. Organize your data folders according to projection and theme topic. Include an MS-word document that provides a list of the GIS files you have compiled, a brief explanation of what the files are comprised of, and a list of projections. This word document will serve as your metadata.

NOTE: The following are a list of typical GIS file type extensions that you may encounter while downloading from the internet resource sites:

- *.zip Zip files are in a compressed archived format that facilitates "bundling" of multiple data files together, and compressing the memory levels for improved download times. You will need to download the *.zip files and "extract" or unzip the originals using the windows file manager extraction and/or decompression tools.
- *.tar.gzip This is a type of file compression / bundling format (similar to the *.zip file above) used by Unix operating systems. The Windows XP *.zip extraction tool will NOT unzip *.tar.gzip files, you will need to use a free software tool called "Winzip". This software is available to download and install on your computer from a link in the "GIS Software/ArcView Extension Downloads" section of the class web site (link = <http://www.wou.edu/las/physci/taylor/g492/winzip70.TMP> download the file to your hard-drive, rename the file "winzip70.exe", run the executable file, install the software on your computer). WinZip will recognize and extract data from *.tar.gzip files.
- *.shp Vector-based shape files, map theme coverages used by ArcView
- *.dbf database file bundled with shape files
- *.shx shape index files that link the *.shp to the *.dbf
- *.prj Arcview map projection files that provide projection information to be used by ArcView Projection Utility (this is a text file you can open and view with Notepad)
- *.tif Raster-based, tagged image files (TIFF) used for scanned maps and air photos.

- *.tfw
Tiff-world files, text files that you can open with notepad that allow ArcView to georegister raster images in geographic space. The *.tif and *.tfw files need to be bundled together.
- *.sid
A “Mr. Sid” raster-based image file. This is a different file format commonly used for air photos in GIS, it is highly efficient at reducing file sizes for web-based downloads. You need to use the “Mr.Sid Image Support” extension to view these in Arcview
- *.sfw
This is a sid-world file that registers the *.sid image in geographic space, similar to the *.tfw file above.
- *.e00
These are “arcinfo export” files from a software cousin to ArcView. These are vector-based map themes in either a point, line, or polygon vector format. You can import *.e00 files into arcview as feature themes. To import you will need to use the following tool: Start-All Programs-ESRI-ArcView GIS3.3-Import71 Once you activate this tool, you will get a pop-up window that will ask you for the “export file name” – enter the directory and name of the *.e00 file; it will then ask you to name the “output data source” = enter the directory and the new name that you wish to give the imported *.e00 file. Once you run the import function, the “output data file” will show up on your list of feature map themes when you add a shape file to your table of contents. Once you get the imported vector theme on your table of contents, make it active, then use the following pull-down menu in ArcView: Theme-Convert to Shapefile this will allow you to create a shape file from the imported *.e00 vector data. Then you’re set to go.
- *.dem
This is a raster-based USGS digital elevation model (DEM) format. You need to use the spatial analyst extension, import the *.dem using the “file-import data source” pull-down menu. This will convert the USGS *.dem grid format to an ESRI grid format for use with ArcView as a “grid data source”