

The term “watershed” describes an area of land that drains downslope to the lowest point. The water moves by means of a network of drainage pathways (Fig. 1, see attached sheets). Making management decisions about a watershed is an important responsibility; decisions must be based on a solid understanding of the characteristics of the watershed and how physical processes shape watershed conditions. Geographic Information Systems is a tool that is widely used in watershed management across the U.S., and particularly in the Pacific Northwest.

The objective of this project 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 and create a poster in Powerpoint providing an overview of the physical and biological characteristics of your watershed. This work will be presented as part of the Spring 2011 WOU Academic Showcase in a theme session entitled “GIS Applications in Watershed Analysis”. The learning outcome is application of GIS skills to a real world problem, and synthesizing concepts and experience gained in the course.

Student Teams	Assigned Coast Range Watersheds
Kelsii & Ricci	1. Gales Creek Watershed (Tualatin Basin, Washington County)
Jody Becker & Janelle	2. Beaver Creek-Waldport Bay-Vingie Creek (Alsea Basin, Lincoln County)
Sandi, mark, Richard	3. Lower Coquille Watershed (Coquille Basin, Coos County)
Samuel & Jody Berg	4. Lower Coast Fork Willamette River (Willamette Basin, Lane County)
Kailey and Taylor	5. Sixes River Basin (Sixes River, Curry County)
Pat and Rick	6. Lower Siletz Watershed (Siletz-Yaquina Basins, Lincoln County)
Matt and Kevin	7. Mill Creek/Umpqua River Watershed (Umpqua Basin, Douglas County)
Trevor and Spencer	8. Kilchis River Watershed (Wilson-Trusk-Nestucca Basin, Tillamook County)
Robert and Jade	9. West Fork Millicoma River (Coos Basin, Coos County)
Rye and Carlie	10. Necanicum River (Necanicum Basin, Clatsop County)
Aqua and Jacob	11. Yamhill River (Yamhill Basin, Yamhill County)
Joey and Tim	12. Lower Siuslaw Watershed (Siuslaw Basin, Lane County)

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

Task 1. Using the Coast Range Watersheds theme from the class website (under the final project section), find all of the sub-basins 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 ArcMap, 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 ArcToolbox, dissolve your sub-basin polygons into one large watershed polygon for your 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 ArcMap 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 ArcToolbox 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 ArcMap 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)	_____

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, clip, mosaic, and assemble the following GIS themes:

USGS DRG (raster)	Soils (vector)	DOQ imagery (raster)
USGS DEM (raster)	Vegetation (vector)	Oregon Wetlands Cover
Bedrock Geology (vector)	Roads (vector)	Streams (vector)
Annual Rainfall/Precipitation (raster)	Streams (vector)	

9-1. As you are searching web sites for GIS data, keep track of the more interesting / successful sites that you encounter. Save, list, and print the URL addresses of your top 8 web links that you find useful in compiling your final project data.

Parameters and other tasks:

- 9-2. Define projections for all of your data files (create *.prj files and print them out to include in your project portfolio).
- 9-3 Convert all map themes to UTM meters, Zone 10 North (NAD_1927)
- 9-4 Clip each vector file so that each theme perfectly overlays the watershed boundary footprint.
- 9-5 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. Streams on precipitation |
| B. Quad DEM's | E. Bedrock on DRG's | H. Streams on vegetation |
| C. Vegetation with polygons labeled | F. Roads on bedrock | I. Wetlands with polygons labeled |

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). 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. 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 12. Using powerpoint and the "watershed poster" template available on the final project links of the class web site, create a 36"x 48" (landscape layout) poster of the results of your final project. Posters should include the following text sections:

- I. Title, names, class information following the poster template on the class web site.
- II. Watershed Summary: A text box (or several text boxes) with Section Headings and 2 to 3 paragraphs summarizing the location, physiographic, geologic, and hydrologic characteristics of your watershed. The watershed summary should include the following items, in well organized paragraphs, under the following section headings:

- a. Watershed name, general location, county (this should include an figure with the state of Oregon outline as a location map, and your watershed area highlighted)
 - i. Figures:
 1. Map of Oregon with watershed location
 - b. Physiography: general description of landscape, elevation range, significant topographic features, summary of elevation data you collected in Task 11 above, climate/precip, vegetation types
 - i. Figures
 1. Quad DRGs
 2. Quad DEMs
 3. Quad DOQs
 4. Climate map
 5. Vegetation map
 - c. General Geology: summary of the types of bedrock and soils found in your watershed
 - i. Figures
 1. Geologic Map
 2. Soil Map
 - d. Hydrologic Summary: summary of the hydrologic data you collected in Tasks 8 above.
 - i. Figures
 1. Watershed outlines and stream overlays
- III. Figures and Maps: Your posters should include your project output maps, as listed above, pasted into the poster template. The easiest way to do this is to export *.jpg files from the ArcMap layout manager, then “insert pictures” into powerpoint and onto the poster template. Each map should be labeled with a figure caption and referred to in the body of your text in section II above.

Task 13. Copy/Save/Compile all of your GIS themes, shapefiles, grids, raster graphics, and poster *.ppt file onto your public P:\folder. 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 a summary of your metadata. Create a web link to access your P:\drive, one member of each team email the professor with team member info, project name, and URL link to public folder in which data resides. Instructor will download your data and post to the class web page for posterity sake.