

Ocean/ENVIR 260, Winter 2006 Lab 2, Land Use Changes in WRIA's 7/8/9	Name _____
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The purpose of this lab is to use the Internet Map Server become familiar with the sites we will be visiting on our field trip next week (Taylor Mountain and Log Cabin Reach), and to examine some changes in rivers over time. Some of the instructions below will require you to figure out how to use the IMS layers and tools available carry them out.

Part I: Black River

Open your browser and navigate to http://128.208.23.127/website/lab2_black_r/ (on the links page as Lab 2 Black River).

Make the “Western WA DEM (hillshade)” layer visible. Zoom in to look at the topography of the Puget Sound area. Note the location of the Olympic Mountains to the west of Puget Sound. Note the location of the Cascade Mountains to the east of Puget Sound. Try to locate Lake Washington on the DEM (hint: it's between Puget Sound and the Cascades).

- 1) Make the “WA Major water bodies” and both “Rivers and Streams” layers visible. Identify Lake Washington, and zoom in on it (make sure that you don't zoom in too far – you want to also be able to see the rivers and streams connected to Lake Washington).
 - a) What major river runs into the south end of Lake Washington? (It will be easier to see river names if you now turn the DEM layer off).
 - a) What other major rivers are in the area?
 - b) Now zoom in on the southern end of Lake Washington so that the city of Newport Hills is at the top of your screen and the city of Sea-Tac is at the bottom. What is the name of the small river that flows connects to the Green/Duwamish River?

This ArcIMS project includes several layers created from data collected at different times in recent history. This information was taken from the Puget Sound River History website. Additional information may be found by visiting the River History website at <http://riverhistory.ess.washington.edu/index.html> and clicking on the “data” link. The different types of layers are as follows:

- GLO Plat maps of study area – The General Land Office (GLO) mapped the Puget Lowland between about 1850 and 1890.
- TSHEETS – a.k.a. topographic sheets. These maps were created by the U.S. Coast & Geodetic Survey, and are the most comprehensive and detailed early map representations of *nearshore* conditions in the second half of the 19th century. (Note the limited area coverage.)
- Aerial photos – taken at various times in the past. These photos have been orthorectified (corrected to be true representations of the earth's surface) prior to inclusion here. (Be sure to check the title box as well as the individual boxes.)

- 2) Examine this area and the changes that have occurred over time. Hide the layers on Rivers & Streams and DEM, which depict recent conditions. We will use these layers these later for comparison
 - a) Starting with the earliest data layers and moving forward in time, list the layers you will use to trace changes over time, noting the years when the data were collected for each layer.
 - b) What do you observe about the path of the Black and Cedar Rivers in the two oldest layers?
 - c) Based on the oldest layers, what can you tell about the direction of flow in these rivers? Arrows in GLO indicate that the Cedar flows into the Black. The Black River flows south from the south end of Lake Washington into the “Duwamish, where it joins the “White” in flowing north into the Sound.
 - c) What do you observe about the Black and Cedar Rivers in the next oldest layer? Focus on the same area shown.
 - d) What do you observe about the path of the Black and Duwamish Rivers in the next oldest layer?
 - e) What do you think might account for any differences you might have observed between the oldest and next oldest layers in the courses of these three rivers?
 - f) What do you observe about the general changes in the area south of Lake Washington between the times of the two most recent layers?

- g) What do you observe about the specific differences in the channel of the Black River between the times of the two most recent layers? What is now located at the former upstream end of the Black River?
 - h) Can you see any evidence of Black River in the “WA Land Use/Land Cover” layer?
 - i) What is the predominant type of land use in the area where the Black River used to flow?
- 3) Turn on the “Puget Sound DEM with bathymetry”.
- a) What do you notice about this DEM compared to the “Western WA DEM”?
 - b) Try to follow the channel of the Black River in the both DEM’s. Is there any evidence of the Black River in either DEM?
 - c) How do the location & shape of the Black River channel compare between the most recent and the oldest layers?

Part II: Field Trip Sites

Open your browser and navigate to http://128.208.23.127/Website/lab2_issaq/viewer.htm (on the links page as Lab 2 Issaquah Creek). Turn on the “Study Areas” layer showing the 2 field trip sites. Zoom in on the tiny areas highlighted on the overview map. We will be visiting both of these sites on our field trip on January 20th.

- 4) Consider the more southeasterly study area as “Area A” and the more northeasterly study area as “Area B.”
- a) What are the actual names of the two study areas? In which WRIA are they located (number and name)?

- b) What is the dominant stream that flows through these sites? Into what major water body does it flow? Trace the remaining streams and water bodies through which water flows before reaching Puget Sound.

5) Zoom in on Area A.

- a) What is the predominant land cover in the area?
- b) Using the aerial photo layer, how dense does the forest cover in the eastern stretch of this study area (where we will visit) appear to be? How can you tell?
- c) What two major tributary streams are in the area?
- d) What structure parallels the more northerly of these tributaries?
- e) What significant type of land cover alteration becomes visible in places by following the stream and structure northeastward?
- f) What major reserve area is just south of Area A? (Hint: use the land ownership layer.)


6) Zoom in on Area B.

- a) What present-day rivers and streams are designated in this area by the river/stream layers?
- b) There are two layers that indicate conditions approximately a century ago. How do the locations and shapes of rivers and streams in this area differ between each of these older layers and the present river/stream layer?

- c) Give at least two possible explanations for any differences you observe.
 - d) What additional layers can you use to help you confirm the actual present-day configuration of the stream channel? What, if anything, do these layers tell you? Which do you think is most accurate?
 - e) What are the two predominant types of land cover in the area? Can you match these to features in the aerial photos?
- 7) Use Google Earth to locate and view the two field trip study sites. Then find the location of the recent landslide on the Issaquah-Hobart Road at www.metrokc.gov/kcdot/news/2006/nr060111_roadupdate.htm. (Online video at <rtsp://media01.metrokc.gov:554/video/transit/Issaqhobslide.rm> & <mms://winmedia.metrokc.gov/transit/Issaqhobslide.wmv>)
- a) Use Google Earth to find the location of this landslide. Could it interfere with our ability to travel from site A to site B on the Jan. 20 field trip? If so, is there an alternate route?
 - b) Consult www.KING5.com for about flooding conditions on the east side. What other effect of the creek in this sub-basin is in today's news?

Part III: Tolt River Restoration

We will not be visiting this site next week when we go on our field trip. However, this study site illustrates one of many instances where humans decided that it would be best to divert the course of a river from its natural path.

Note a new tool added to the IMS window: clicking on the binoculars icon . This opens a search box that allows you to type in a search term for the active layer. After the search a link usually appears at the bottom of the page that will zoom you to that search item in the window.

- 8) Open your browser and navigate to http://128.208.23.127/website/lab2_tolt/. Make both “rivers and streams” layers visible, and then find the location where the Tolt River joins the Snoqualmie River. Zoom in on the area where these 2 rivers intersect. We will again be looking at various data sources to determine how the Tolt River has changed over time.
- a) List the names and dates of the data layers available for this area.
 - b) What do you notice about how the river has changed over time?
 - c) In the oldest layer, what appears to surround the Tolt River where it joins the Snoqualmie River?
 - d) What currently occupies the area where the Tolt River where it formerly flowed into the Snoqualmie River?
 - e) What do you think might have occurred to cause the changes you observe over time?

Part IV: Homework

1) Answer the following questions about the history of the Black River based on historical accounts. You can find information on the Black River in your coursepak. Read Sato, M. 1997, Chapter 5, Southcenter to Supermall. (note: this chapter was omitted from the table of contents in your coursepak – it follows immediately after Sato, M. 1997, Chapter 3). You can also consult this website for a brief overview of the Black River:
http://www.historylink.org/essays/output.cfm?file_id=2624

a) What reasons does this article cite for the changes in the river course in the early 20th century?

b) Where does the water that used to flow through the Black River flow today?
Most of it flows out through the Lake Washington Ship Canal. A small amount of flow still enters the Duwamish.

c) How would these changes in river configuration at the south end of Lake Washington have affected salmon migration and habitat?

d) What do you think this says about people living in the area at the time such drastic changes to salmon habitat were being made?

e) Do you think it would be possible to restore the Black River to its original path? If so, what changes would be required?

- 2) Navigate to <http://dnr.metrokc.gov/wlr/cposa/tolt-restoration/index.htm> to learn more about the Tolt-Snoqualmie River area.
- a) What was built that resulted in the path currently taken by the Tolt River?
 - b) What is the definition and purpose of such a structure?
 - c) Why do you think the levee was built in its current shape?
 - d) How do you think this construction altered salmon habitat?
 - e) How has riparian habitat at this location changed over time?
 - f) What is the purpose of the proposed renovation project in this area? Will changing the levee shape as Metro KC proposes result in improved salmon habitat?
 - g) What else might need to be done to restore this section of the river to increase habitat quality for salmon?
 - h) What things might prevent or make it difficult for such restoration projects to be completed?