

**Geography 4501 Western Water  
Mid Term Exam  
Spring 2008**

**Name:** \_\_\_\_\_

On the map below: 1) match the river location number with the name of that **river**, and  
2) place the following **cities** in their appropriate location in the west: Albuquerque, Las  
Vegas, Los Angeles, Salt Lake City, San Francisco, Seattle, Phoenix, Portland (10 pts).

- |   |   |   |
|---|---|---|
| <input type="checkbox"/> Colorado River     | <input type="checkbox"/> Arkansas River   | <input type="checkbox"/> Rio Grande River |
| <input type="checkbox"/> South Platte River | <input type="checkbox"/> Sacramento River | <input type="checkbox"/> Missouri River   |
|   | <input type="checkbox"/> Columbia River   |   |

[ MAP OF WESTERN U.S. HERE ]

2. Place the following events (+ or – 5 yrs) under the timeline below. Write the letter  
in the relative position below the dotted line. (10 pts)

- a. Colorado River Compact
- b. Endangered Species Act
- c. Hoover Dam
- d. Louisiana Purchase
- e. Biggest drought on the CO River (drained Lake Powell to all-time low)
- f. Formation of the U.S. Bureau of Reclamation/Reclamation Act
- g. First legal water rights in Colorado
- h. Height of the dam-building era for the ROR
- i. California Water Project
- j. John Wesley Powell's report on the Colorado River

<1800          1850          1875          1900          1925          1950          1975          2000

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**\*\*Each of the following questions is short answer; complete answers in 4-5 sentences maximum. (3 pts each)\*\***

3. Briefly describe the concept of a hydraulic society and name two specific types.

4. What is the idea of the 'public trust doctrine'? Name two countries that have based their water management systems on it?

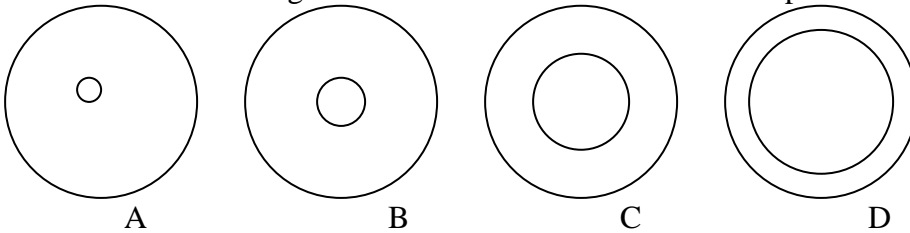
5. MacDonnell and others talk about new issues in water management that were not part of the 'old west'. Give two examples:

6. Several authors discussed the idea of the 'productivity of water'. What is it, and why does it matter for western water?

7. Give at least two reasons why many aquatic species have been listed as endangered?

8. Give two examples of how urban areas can affect water quality..

9. Postel/Richter's diagram below illustrates what relationship? Describe A-D.



10. Describe three things that science (physical and/or biological sciences) can offer to the future management of western water.

11. What is the prior appropriation doctrine? Why was it seen as a better system for the west than the riparian doctrine?

12. Name two specific reasons that the federal government will remain a key player in western water management.

**Presentation Notes Spring '09** some, not all, ideas worth remembering

Bart Miller- Water for the Gunnison

Why fish endangered?

>Obstructions, loss of habitat, pollution, non-native species

Why mediation better than litigation?

>More stakeholders involved, more get needs met

Martha Moore/Dan Birch-CO River District & Energy

Common thought is that there is up to 1 million acre-feet of CO River water left to develop. Why does the CO River District think it may be closer to 300,000?

> CO's allocation in '22 compact is ~3.2 MAF: ~1.8 MAF used now,;Trans-basin diversions take ~0.6 MAF; evaporation takes ~0.3 MAF; another 0.2 MAF already adjudicated (folks have water rights)

What are some other wild cards for CO River future?

- > Climate change; endangered species; energy development; population growth
- > Power generation to drive oil-shale extraction could require up to 10x the electricity than the largest coal-fired plant currently in CO.

#### Tim Murrell- water in Douglas County

- > Douglas County is ground water dependent, mostly non-renewable.
- > major population growth during last 15 years
- > have created zoning districts to control development impact on water resources
- > County government taking the lead on water conservation, lead by example

#### Drew Paternell- Trout Unlimited water project

Why western streams have low/no stream flow?

- > aridity; prior appropriations (state law); population growth
- > TU work backed by science, focus on preservation and restoration
- > advocates of instream rights, backed '08 legislation in CO that gives \$ to state to purchase senior rights

#### Greg McCabe- USGS and the Upper Colorado

- >the Colorado- a river in trouble.
- > analyzed trends, and future risks posed by climate change
- >50-75% risk of not meeting CO river compact obligations in future warming scenarios
- > reduction in flow so great w/climate change that even unlimited storage would not significantly reduce this risk

#### Beorn Courtney- 3 states project

- > a project that will obtain water, and test out habitat theories
- > project to support species and avoid litigation
- > scientific rigor is critical
- > setting a new environmental standard for the region
- >long-term program of adaptive management (check results and adapt in future)

#### Karin Sheldon- Water law basics

- > water allocation is covered by state law, water quality usually a federal issue
- > beneficial use is the basis, measure, and limit of the law
- > just what is beneficial changes through time
- > federal lands have water through Federal Reserved Water Rights

#### Sheila Murphy- Boulder Creek Watershed

- > water quality varies from the upper to lower water shed
- > urban influences affect water quality
- > Boulder moved water intake, and wastewater outflow over time
- > emerging contaminants a concern

#### Kristin Averyt- climate change and water

- > use published research
- > scientific rigor important
- > conveying certainty important- used words 'likelihood' and 'confidence'
- > spring pulse (beginning snowmelt) up to 2 weeks earlier in CO
- >2050 projections: summer temp warmer than winter, drier summers w/drier soil; may see 15-20% reduction in CO River flow

