

## Memorandum – Western Oregon University

**From:** Dr. Steve Taylor, Earth and Physical Sciences Department  
**To:** Participants of 2009 Eco-Informatics Summer Institute  
**Date:** June 15, 2009  
**RE:** Deschutes River Module June 21-24, 2009

Colleagues:

As part of the 2009 Eco-Informatics Summer Institute, I am facilitating a 3-night rafting trip on the Deschutes River of central Oregon. We will have a fun-filled adventure examining the regional geology and geomorphology associated with central Oregon. The focus will be on merriment, camping, adventure, team building, and field science. I will serve as the scientific facilitator and have a broad-based background in environmental geology, fluvial geomorphology, and field geology. Ed Bartlett (Bluefish, Inc.) from Bend, OR will provide the river/raft guide service. Ed has an extensive background in outdoor education, group dynamics, and team building. Below is a summary of vital information related to the 2009 EISI “Deschutes River Module”. The learning objectives for this experiential adventure are attached at the end of this memo.

### Travel Dates:

Sunday June 21, 2009 – Wednesday June 24, 2009. The trip departs from H.J. Andrews Experimental Forest on Sunday afternoon, with 2.5 days of rafting on the central portion of the Deschutes River, between Trout Creek and Maupin, OR. The trip itinerary is attached, see below.

### Trip-Related Web Site:

This field module is derived from a summer field course that I have been offering at Western Oregon University for the past several years. The EISI Deschutes Module web site is located at: URL <http://www.wou.edu/taylor> and follow the course links to “Eco-Informatics Summer Institute” ([http://www.wou.edu/las/physci/taylor/eisi/eisi\\_su09.htm](http://www.wou.edu/las/physci/taylor/eisi/eisi_su09.htm)). The web site offers an extensive number of links to background readings, maps, field trip guides, field photos etc.

### Philosophy:

There is a high probability that you will have fun, make new friends, and learn something while on this trip. The excursion will include group exercises, field stops, hiking, camping, site-seeing and informative discussion. The emphasis is on camping, outdoor adventure, field science, and FUN! We will be river rafting through a variety of water conditions, refer to the “Raft Trip Guidelines” attached below.

### What to Bring on Field Trip:

Sleeping Bag / Pillow	Texas/Sandals/Water Shoes	Warm Night Clothes	
Tent (tent teams encouraged)	Pocket Knife / Flashlight	Cool Day Clothes	Positive Attitude
Toiletries	Lighter / Matches	Sunblock / sunglasses	Sense of Humor
Water Bottle	Mess Kit	Hat / sun shield	Willingness to Learn
Field Pack / Day Pack	Clip Board / Field Notebook	Towel / Swim suit	Fly Fishing Gear
Sturdy Hiking Boots	Pencils/Pens,Calculator,ruler	Cash / Credit Card	
Sleeping Pad	Rain Jacket / Pants	Camera/Waterproof Camera	

\*Note 1: in terms of clothing, June is still a transition period for weather in Oregon. We will likely have sunny bright days on the Deschutes, but rainy weather is a possibility. The water will be cold! Sunburn is common on the Deschutes, bring sunblock! In general, cotton clothing and water sports are not compatible. Synthetic fibers, sportswear and river clothes are designed to keep you warm and comfortable even when wet. Cover your bases and be prepared for hot/dry and cool/moist weather.

\*\*Note 2: tents, sleeping bags, pillows, and sleeping pads must be of small enough size so that they can be stowed in dry bags on the rafts. Sleeping bags should be SINGLE PERSON and constructed of COMPRESSIBLE synthetic fibers. You must be able to stuff and compress the sleeping bag into small spaces;

compression stuff sacks are ideal. Large, cotton sleeping bags are not acceptable. They are difficult to compress, take up much space, and are difficult to dry out if they get wet. All of your clothes/personal items must fit into one water-proof river sack (about the size of a large pillow case) while rafting on the river. We will spend 2.5 days paddling and rafting on the river. A waterproof camera is best for taking pictures from the raft. Non-waterproof digital cameras are good for times when we are not on the raft. Disposable waterproof cameras are available at your favorite department stores. Make sure you bring a calculator, pencils, ruler, protractor, and notebook. Ziplock bags are useful for keeping notebooks / field guides dry while floating through white water. It is also helpful to have a small waterproof dry bag for snacks and other personal gear while paddling on the river. The river guide will provide “dry bags” for your personal gear, but you can bring your own if you have them. The Deschutes River is associated with world-class fly fishing. We will have plenty of time for relaxing and fishing, bring your gear if you have it.

### **Food and Drink Situation:**

With the exception of dinner on the first night at Trout Creek, the river guide will provide a cook staff and 3 meals per day + snacks while we are rafting on the river (see itinerary sheet below). Generally, meals will NOT be geared towards vegetarians. It is my understanding that the 2009 EISI group has 4 vegetarians attending, one of which is dairy and gluten free. Please contact me by email at [taylors@wou.edu](mailto:taylors@wou.edu) if you have other special dietary considerations. All individuals are encouraged to cover themselves by packing additional goodies in their personal bag if they have special food necessities (e.g. special snacks, dark chocolate, etc.). The river guide will provide basic beverages that may include water, hot chocolate, juice, coffee, tea. If you are a coffee aficionado, diet-coke user, or other specialty drink person, you should cover yourself and bring the proper quality and quantity in your personal gear. The river guide and cook staff will cover the basic food-drink scenario, but it's up to you to cover yourself on any specialty items. Beyond the basics, we, as a group, and individuals, will be responsible for bringing other drinks, libations, all-grain natural beverages, and/or vine nectar. Additional ice-packed coolers can be stowed on the bag boats. The general rule on the river is that you will run out of your favorite beverage sooner rather than later, so plan ahead.

### **Showers/Bathing:**

No showers are available at any of our camp spots. Be prepared for refreshing, crisp river baths. Biodegradable, environmentally-friendly soap and shampoo are advised. Pay showers are available at the Maupin City Park, once we pull off the river.

### **Pre-Trip Orientation and Reading Assignment:**

A pre-trip meeting will be held on Friday, June 19, 2009, from 10 AM – 12 PM in Rm 234 Gilmore Hall, OSU main campus. You will be provided a comprehensive field guide and work book. For more information and background reading, visit the aforementioned web site at [http://www.wou.edu/las/physci/taylor/eisi/eisi\\_su09.htm](http://www.wou.edu/las/physci/taylor/eisi/eisi_su09.htm) . To make the most of the trip, it is ideal to read several background papers to familiarize yourself with the fundamental concepts are regional setting. The papers are listed below:

- (1) Ritter et al., 2006 - Introduction to Drainage Basins and Fluvial Hydrology
- (2) O'Connor et al., 2003a - Overview of Deschutes Geology, Hydrology, Geomorphology

To maximize the pre-reading experience, a set of pre-trip “preview” questions are attached. Completing the pre-trip reading and answering the preview questions will prepare you to maximize your learning experience as part of the EISI Deschutes River Module.

Please email or call if you have any questions (see contact information below). Don't forget to let me know if you have dietary concerns. Have fun and good luck preparing for the 2009 Eco-Informatics Summer Institute.

Sincerely, Dr. Steve Taylor, Office: 503-838-8398 Cell: 541-760-9216 e-mail: [taylors@wou.edu](mailto:taylors@wou.edu)

**2009 Eco-Informatics Summer Institute**  
**Itinerary: Geology and Geomorphology of the Lower Deschutes River**  
*Field Science - Regional Geology – Rafting - Team Building - Big Fun*

**Day 1 Sun. June 21 “Travel Day”**

4:00-6:30 PM drive from HJ Andrews Experimental Forest to Trout Creek Campground (~14 mi. north of Madras, OR)

*Directions:* Exit HJ Andrews and intersect OR-126 MCKENZIE HWY; Turn LEFT (east) onto OR-126/MCKENZIE HWY; Continue following MCKENZIE HWY. for 14.1 mi; MCKENZIE HWY becomes OR-126/CLEAR LAKE-BELKNAP SPRINGS HWY. continue 19.7 mi; Keep RIGHT at the fork to go on OR-126 East; follow east to Sisters, OR for 23.4 mi; Continue on OR-126 east to Redmond for 20.0 mi; Turn north onto US-97; Continue to follow US-97 N. 26.0 mi to Madras, OR; From Madras, go north about 2.5 miles on US 97, then north (turn left) onto on the road to Gateway and go about 8 miles. In Gateway, turn on first right after railroad tracks and continue north about 3 miles. Gravel road turns to washboard, and descends into the Deschutes Canyon. Trout Creek Campground and boat launch is at the end of the road. Total one-way mileage = ~120 miles (~2.5 hours driving time).

*Food Logistics:* The group will be on it’s own for dinner this first night. There are numerous grocery and fast food stops in Sisters, Redmond, and Madras. Dinner can either be consumed on the road, or at Trout Creek once camp is set up. Portable cook stoves and camp cookware will be available. **NOTE:** Madras will be the last available grocery until after the rafting trip. It is recommended that the group “gear up” in Madras with any beverages of choice, ice in group coolers, etc. Including this first night, we will be camping on the river for a total of 3 nights. The river guide will provide basic food, snacks, water, juice, coffee, tea while camping/rafting on the river, but it is up to individuals and the group to provide their own special libations and snacks they may like to have during the trip. The general rule on the river is that you will run out of your favorite beverage sooner rather than later, so plan ahead.

*Camp:* Trout Creek

**Day 2 Mon. June 22 "Rafting, Rapids, and Rays"**

Morning Raft Preparation / River Launch (vans will be shuttled to take-out location)

- Stop 2-1 Lower Trout Creek – Road Cut (Geologic Overview / Geomorphic Observation)
- Stop 2-2 Warms Springs Confluence / Railroad Cut
- Stop 2-3 Axford Flood Deposits
- Stop 2-4 River Mile 78.5 Whiskey Dick; Camp-site lecture on Deschutes River hydrology and geomorphology.

*Food Logistics:* River guide will provide breakfast, lunch, dinner, and snacks.

*Camp:* Whiskey Dick

**Day 3 Tues. June 23 "Another Day Floating the River"**

Begin Day Campground worksheets / group exercises around breakfast table

Stop 3-1 Morning Hike to “The Pot” Overlook (from Whiskey Dick)

River Mile 77 Whitehorse Rapids (Yee Haw!)

Stop 3-2 River Mile 76 – “The Pot” – lower end

*Food Logistics:* River guide will provide breakfast, lunch, dinner, and snacks.

*Camp:* Buckskin Mary

**Day 4 Wed. June 25 "Return from the 'Chutes"**

Begin Day Campground worksheets / group exercises around breakfast table

Stop 4-1 River Mile 64 – Buckskin Mary / Dant Overlook

Stop 4-2 River Mile 62.5 – Outhouse Flood Bar

~1:00 PM Pull off river, unload rafts, reconnect with vans.

*Food Logistics:* River guide will provide breakfast, snacks, lunch

3:00 PM Return to HJ Andrews via Madras-Redmond-Sisters

## Deschutes White Water Raft Trip Guidelines

### What to Wear:

Shorts, t-shirts and sport sandals or tennis shoes are usually suitable for summer river trips.

NOTE: As part of this field trip, you will be hiking from the raft / camp on uneven and steep ground. Puncture vine and cheat grass are prevalent in central Oregon. Please make sure you bring sturdy hiking boots or hard-soled sports shoes along on the raft portion of the trip (i.e. a pair of water sandals for the raft and sturdy boots for your personal water bag).

While most days are typically warm and sunny, some days and evenings can be cool. Therefore, each person should bring a sweater and wind breaker or rain jacket. Synthetic pile or wool sweaters are recommended, as cotton will not work as an insulator if wet. Please bring secure river sandals, water shoes, or tennis shoes for your feet. Shoes must be securely fastened to your feet, otherwise they could be swashed away while drifting through rapids.

Those with sensitive feet may want to bring wool socks or wet suit booties. Also, be sure to bring a strap for your eyeglasses or sunglasses. All of your clothing will get wet. Be sure to bring an extra set of clothes and your personal gear. In packing your personal gear please keep your needs to minimum. Plan according to possible weather conditions and the length of your outing. If your personal gear will not fit in a reasonable size gym bag you have too much and you will need to leave something behind. We will need to prepare for transporting all personal gear and camp equipment in the rafts. An old hat to keep the sun off your face is a very good idea, but remember, it may end up in the river.

### Expectations for River Trips:

Safety is of the utmost importance when making a River Run. The rafts and equipment are of the highest quality and will serve you well when used in the proper manner.

*Life jackets.* Life jackets are to be worn at all times by clients and staff while on the river. The jacket is designed to keep you afloat in calm and/or rough water. It is designed to keep your head and face out to the water without swimming. Life Jackets are the most important lifesaving device that you will use. Treat you life jacket carefully.

*Swimming.* Swimming will be done only at specified times. Times and places will be decided by the guides. Life jackets will be worn when swimming.

*In the raft.* In the raft it is important to listen to the directions from the guides. In the raft it is important to not interfere with the guide or other paddlers. This is a group effort and everyone must perform as well as they are able.

### Frequently-Asked Questions:

*Is the Deschutes river trip all white water?* No – and most of the rapids are fairly short in length, interspersed with quiet stretches where current carries you along at a comfortable 3 to 6 miles and hour.

*Do I have to be a good swimmer?* To be able to swim is helpful, but is not really needed for a safe and enjoyable trip. You will be wearing a Coast Guard approved Life Jacket at all times.

*Will we encounter rattlesnakes and annoying insects on the trip?* Encounters with rattlesnakes are rare, as these creatures make every effort to keep away from man. Insects are easily controlled with a good repellent, and river breezes help keep them at a minimum.

*Must I be an athlete to participate as a team member of a paddle boat?* No – paddling does involve some physical effort and modest coordination, but the activity is well within the physical capacity of an average person. Desire is much more important than physical prowess.

**EISI Deschutes River Module - Summer 2009**  
**Steve Taylor – Western Oregon University**

**Learning Outcomes and Objectives**

- (1) To engage team building in the context of outdoor adventure and experiential education
- (2) To acquire knowledge of the regional geologic, hydrologic, and geomorphic setting of western Oregon
- (3) To apply spatial and temporal scaling concepts to watershed systems
- (4) To develop skills in field-based observation, data collection, analysis, and hypothesis testing
- (5) To gain experience with techniques of landscape analysis and interpretation of the geologic record

**Course Activities and Student Assessment**

- I. Pre-Trip Reading Assignment (distributed week of June 15)
  - a. Review questions due before start of field trip (during week of June 15)
- II. Pre-Trip Orientation Meeting (Rm 234 Gilmore, OSU; Friday June 19, 10 AM – 12 PM)
  - a. Group introductions (Tullos, Taylor)
  - b. Fieldtrip orientation and logistical planning (“what to expect”) (Taylor, Tullos)
  - c. Introduction to Deschutes River Module Content (Taylor)
    - i. Regional physiographic setting; field trip itinerary
    - ii. Review / introduction: fundamental concepts of geology, geomorphology, and watershed systems
- III. Field Trip Content (June 21-June 24)
  - a. Regional physiographic setting of western Oregon-Cascades-central Oregon (tectonic setting, topography, climate) (Taylor)
  - b. Regional geology, geomorphology and hydrology of central Oregon / Deschutes Basin (Taylor)
  - c. Introduction to geologic observation and landscape analysis (Taylor)
  - d. Fundamental principles of hydrology and geomorphology (Taylor, Tullos)
  - e. Fundamentals of Oregon fisheries, habitat, watershed assessment, and river restoration (Tullos, Taylor)
- IV. Active Learning Assignments (i.e. 3-4 “lab assignments” completed in field; TBD)
  - a. Field observation and hypothesis development
  - b. Map reading and cartographic analysis
  - c. Hydrogeomorphic data analysis
  - d. Conceptual modeling
- V. Field Trip Reflection Paper (3-5 page double spaced)
  - a. “take-home” exam questions
  - b. open-ended reflection

Required materials: field guide (provided), calculator, writing/drawing implements, rulers/engineers scale, protractor, note book, camera, waterproof ziplocks

Deschutes River Module student deliverables: (1) pre-trip reading questions, (2) active learning assignments, (3) post-trip reflection paper

## EISI DESCHUTES RIVER MODULE: PRE-TRIP READING QUESTIONS

### **Reading 1: Excerpts from Ritter et al., 2006 - Introduction to Drainage Basins and Fluvial Hydrology**

*Read the Ritter et al. introductory chapter on drainage basins. Provide a brief definition for the following key words and concepts (arranged in order of appearance in chapter).*

Watershed-

Drainage divide-

List the external variables influencing watershed processes-

Evapotranspiration-

Runoff-

Infiltration-

Interflow-

Return flow-

Hydrograph-

Base flow-

Flood stage-

Unsaturated (vadose) zone / Saturated (phreatic) zone-

Water table-

Aquifer-

Surface water discharge-

Mean annual discharge-

Recurrence interval-

Paleoflood Hydrology

Denudation-

Sediment Yield-

Sediment Budget-

List the range of historic denudation rates determined in U.S. drainage basins (mm/1000 yr).

What about ranges of global denudation rates?

List the factors that influence river morphology and process-response patterns over time.

**Reading 2: O'Connor et al., 2003a - Overview of Deschutes Geology, Hydrology, Geomorphology**

Read the O'Connor et al. Deschutes overview paper. Answer the following questions (arranged in order of appearance).

1. According to the authors, what are the two remarkable aspects of the Deschutes River?
2. True or False – the Deschutes is impounded.
3. True or False – The Deschutes is in a significant state of ecological degradation.

4. Fill in the Deschutes Fact Table Below:

Drainage area \_\_\_\_\_ sq. km  
Basin length \_\_\_\_\_ km  
No. of Dams \_\_\_\_\_  
Primary Tributaries: \_\_\_\_\_  
General Flow Direction: \_\_\_\_\_

Western Physiographic Boundary: \_\_\_\_\_  
Eastern Physiographic Boundary: \_\_\_\_\_  
Northern Physiographic Boundary: \_\_\_\_\_

Oldest Bedrock Underlying Basin: \_\_\_\_\_  
Youngest Bedrock Underlying Basin: \_\_\_\_\_  
Bedrock types in the eastern portion of the Basin: \_\_\_\_\_  
Bedrock types in the western portion of the Basin: \_\_\_\_\_  
Average Annual Runoff for Basin: \_\_\_\_\_ cu. m \_\_\_\_\_ m  
Average High Flow Months: \_\_\_\_\_  
Average Low Flow Months: \_\_\_\_\_

5. Would you best characterize the Deschutes River discharge as “seasonally flashy” or “perennially steady”? Explain your answer.
6. What are the primary climatic and geologic factors that control the hydrologic characteristics of your answer in question 5 above?
7. On a geologic time frame (1000's to millions of years), what types of geologic events influence the sediment load and sediment transport capacity of the Deschutes River?
8. How do historic records of sediment transport on the Deschutes compare to the long-term, geologic rates of transport?