Ecogeomorphology of the Tuolumne River Course Syllabus

Spring 2014
WFC 102/102L – 7 units
(1105 F Watershed Building)

Peter Moyle Professor/Instructor of Record
Sarah Yarnell, Carson Jeffres, Contributing Instructors
Anna Steel, TA

Lecture on Thursdays (1-3p); Lab on Fridays (1-3p)
Plus Field Trips
Student enrollment limited to 12.

Readings:

Confluence: A Natural and Human History of the Tuolumne River Watershed
Mount JF, Purdy SE, Epke G, Finger M, Lusardi RA, Marks N, Nichols AL, Null S, O'Rear T, Purdy SE, Senter A, and Viers JH. 2010.
http://watershed.ucdavis.edu/tuolumne/resources/ConfluenceTuolumneV1.pdf

Plus other handouts as provided.

Course Goals

The field of watershed science, and specifically the study of rivers and streams, is inherently multidisciplinary, involving a broad array of physical, biological and social sciences. Traditional hierarchical undergraduate and graduate education programs that train students in the fields that support watershed science necessarily emphasize in-depth study within a specific discipline. This focused education is vital to producing professionals with useful technical and analytical skills. However, most students who pursue careers in watershed science and management rarely work solely within their discipline. Rather, their work is inevitably integrated with other professionals addressing related issues with different skill sets. The ability to work closely and collaboratively with professionals from different backgrounds is fundamental to success in the field of watershed science and management.

This course seeks to introduce advanced undergraduate and early graduate students to multidisciplinary collaborative watershed and stream analysis through combined laboratory and field study of a selected stream system. Topics relating to management of stream systems will be discussed throughout with emphasis on the management of Sierra Nevada rivers in California. Students from diverse backgrounds will work in cooperative interdisciplinary research teams to collect and analyze field data from the Tuolumne River system. These teams will present the collection and results of the field data in the form of a 3-5 minute video and written report due at the end of the class. Data collection will focus on key ecological issues relevant to management within the watershed: what are the impacts of regulated flow regimes on aquatic biota in the Tuolumne River watershed, what are the impacts from the recent Rim

fire, and what long-term monitoring data are needed to address on-going conservation strategies in the face of climate change?

Class Requirements

The course is worth 7 units. Lecture/Lab will meet weekly during spring quarter from 1-3 pm on Thursdays and 1-3 pm on Fridays. The classroom meetings will involve lectures by the instructors on topics related to the watershed science, Sierran Rivers and the Tuolumne River watershed. Class participants are required to participate in a one-day field study in the American River watershed (May 17) and a ten-day field study of the Tuolumne River watershed (June 14-23). Grading will be deferred until one week following completion of fieldwork.

Grades in the course will depend upon quality of work (including lab write-ups, and field logs, known as Flogs, and final class projects) and quality of effort and participation in field study. It is important to note two key expectations for students in this class. First, this course emphasizes collaborative study. This means that efforts to foster effective collaboration will play an important role in determining the final grade. Second, because this course is limited to advanced undergraduate and graduate students, there is an expectation that each student will be knowledgeable within their specific discipline, and will provide that expertise to their collaborative team and the entire class effort. This means that class participants must assume the role of both student and teacher, learning from and educating their peers.

There are several expected deliverables for this class, including the final team project, lab write ups, and field trip participation.

Lab write-ups

For weeks 3-9, you will submit a summary or work completed from the previous week's lab exercise (schedule below). The work should be submitted via email to Anna Steel (annaesteel@gmail.com) in a format appropriate to the exercise. Lab work is to be sent prior to the start of Friday lab of the following week (e.g., Week 2 Lab work is due before 1 pm Friday in Week 3).

Final team projects

Each team consisting of four students will produce a written report and a ~3-5 minute video describing some aspect of the Tuolumne River watershed (suggested topics below). The written report will have a traditional 10 page research paper format with appropriately documented references. To assist in the development of the video, we will be providing access to the necessary hardware (e.g., cameras, memory cards, etc.) and software (i.e., video editing software), and brief instruction in their use. It is up to each student team to determine how best to divide the work of producing both a written report and a video; however, it is fully expected that each student will be involved in all aspects of the project and that no one team member is completing the bulk of the work.

To facilitate video production, you will determine an appropriate topic, prepare a 1-2 page "treatment", and write up a detailed description that includes the narrative or "script" and accompanying "story boards". The topic write up should be sufficiently detailed (~500 words) that you can describe the

content and importance of the subject. The treatment will follow a general outline that will be provided in class. The script will also follow a general outline provided to you, but is intended to serve as the blueprint for your video. The script will be accompanied by storyboards that are effectively sketches of each scene in the video (hand out to be given in class). The video treatment, script, and storyboards, are intended to provide sufficient written background such that the physical production of the video will be streamlined, informed, and require less of your time to create. That being said, it is likely that some creativity will happen during the editing process, which is not unexpected. Further instruction will be given on the video production and editing, but please keep in mind that the videos are intended to be educational in nature. Examples from previous classes will be provided for reference.

After project submission and completion of the course, reports, videos and accompanying materials will be posted on the class website to be used in subsequent classes and in related outreach materials. It will be the responsibility of the students to see that the video, and all supporting data, will be suitable for incorporation into the class website. The Center for Watershed Sciences retains all rights to any material collected or created as part of this class.

Suggested Report/Video Topics:

- Impacts of the Rim fire on stream biotic conditions
- Impacts of the Rim fire on hydrogeomorphic conditions
- Importance of headwater streams and meadows to watershed ecology
- Water resource management in an era of hydroclimatic change
- An assessment of the River Continuum Concept in the regulated Tuolumne River
- Stream/floodplain restoration in the lower Tuolumne River

Student Costs

There are no laboratory fees for this course; however it is expected that students will provide their own personal field equipment (backpack, appropriate field clothing, field notebook, sleeping bag, sleeping pad, etc.). Personal camping items can be rented from Outdoor Adventures. All field costs, including shuttle, guides, equipment and food, will be organized by Outdoor Adventures and supported by the generosity of the Center for Watershed Sciences and the Stephen D. Bechtel Foundation.

<u>Field trips</u>

There will be two field trips (details to be provided in class):

1) American River watershed (Saturday May 17)
2) Tuolumne River watershed (Saturday June 14 – Monday June 23)

Because of the costs associated with these field trips, which are underwritten by the Center for Watershed Sciences, you are required to attend and participate. You are also required to provide two written field logs (or flogs) that describe some personal aspect of the Tuolumne River trip (e.g., short story, poem, diary entry, observation, etc.) that will be entered into the class website.

Class Schedule

Week	Date	Lecture (Lecturer)	Lab
1	April 3-4	Overview (All)	Introduction
2	April 10-11	California Water Geography (Yarnell, water tour discussion)	Basin and Stream Reach Assessment
3	April 17-18	Rivers & Watersheds (Virtual hike/discussion)	Channel Assessment Surveying Methods
4	April 24-25	Physical Processes/ Habitat (Virtual hike/discussion)	Hydrologic Analyses/Video Editing I
5	May 1-2	Aquatic Ecology/Primary Productivity (Jeffres/N. Corline)	Bug methods/ID
6	May 8-9	Plant Ecology/Meadows (E. Wolfe)	Putah Creek Field Trip
7	May 15-16	Foodweb Ecology (Fishes) (Moyle)	Fish methods/ID
8	May 22-23	Regulated River Impacts (Yarnell)	Video Editing II
9	May 29-30	Fire Ecology (Z. Steel)	Project Discussions
10	June 5-6	Climate Change (Yarnell)	
	June 12	Prep for field trip	
	June 14-23	Tuolumne River Field Trip	

Descriptions of Weekly Activities (Readings are to be completed *prior* to the week listed)

››› Week 1
Lecture: Introduction to the course goals and requirements
Lab: Introduction to labs, discussion of student report/video project, schedules
Readings: Field Safety handout in lab; Video Creation handout

››› Week 2
Lecture: California Water Geography
{written topic of team project due}
Lab: Introduction to basin and channel assessment methods, site mapping
Readings: CA virtual water tour videos; *Confluence* chapters 1-3; USFS Field methods chapters 1-4

››› Week 3
Lecture: Rivers & Watersheds discussion
Lab: Survey techniques – cross-sections, long profiles, GPS, sediment analysis
Readings: Lyell Glacier virtual hike & lecture; *Confluence* chapter 4; USFS Field methods chapters 5-8
{lab work from previous week due}

››› Week 4
Lecture: Physical Stream Processes and Instream Habitat

Lab: Hydrologic analysis methods, discharge, water quality; Video editing techniques I
Readings: Tuolumne Meadows virtual hike & lecture; USFS Field methods chapters 9-11; additional video handouts
{lab work from previous week due}

››› Week 5
Lecture: Introduction to Aquatic Ecology
Lab: Aquatic macroinvertebrate sampling methods and species identification
Readings: Confluence chapters 5-6; TBD
{lab work from previous week due}
{written video description or "treatment" and paper outline due}

››› Week 6
Lecture: Plant and Meadow Ecology
Lab: Geomorphic assessment and macroinvertebrate techniques in the field -- Site visit to Putah Creek
Readings: TBD
{lab work from previous week due}

››› Week 7
Lecture: Food Web ecology, fishes and amphibians
Lab: Fish sampling methods and species identification
Readings: *Confluence* chapters 7-8; TBD
{lab work from previous week due}

››› Week 8
Lecture: Impacts of Regulated Rivers on Physical and Ecological Processes
Lab: Video editing techniques II
Readings: *Confluence* chapters 9-12; Yarnell et al. 2010
{lab work from previous week due}
{detailed video script/storyboards and final report detailed outline due}

››› Week 9
Lecture: Fire Ecology and the Tuolumne Rim Fire
Lab: Group project discussions/presentations
Readings: TBD
{group powerpoint presentation due}

››› Week 10
Lecture: Climate Change Impacts and Future Management
Lab: No lab – study for finals!
Readings: *Confluence* chapter 13

June 14-23: Tuolumne River Field Trip

Final reports and videos are due Friday June 27 days after we return – videos to be presented to the class in a final post-field trip meeting Friday June 27. Grades assigned one week following.