



Watershed Analysis & Restoration Using Fluvial Geomorphology

July 23-30, 2011

Geol 451. The focus of this seven-day class is in understanding the complex interactions of natural and human processes on the functions of California's watersheds and rivers as well as innovative restoration methods. Protecting and restoring watersheds is a growing public concern as we attempt to balance California's needs for more water, less floods and greater resource protection.



Field methods in fluvial geomorphology and related hydrologic processes will be explored in streams and watersheds within easy striking distance of the field camp: (1) the North Yuba River, which flows right through the Field Camp, provides a perfect setting for studying

unregulated flow and the significance of hydrologic processes in bedrock and alluviated stream channels; (2) the Feather River watershed, including the nearby Sierra Valley, is a critical contributor to California water resources, and has seen 140 years of



cumulative impacts from logging, grazing, mining, forest fires and road building; and (3) the Little Truckee River, with classic trout-stream characteristics, and provides a unique opportunity to study the



effects of water diversion on stream habitats. We'll explore channel responses to impaired watershed functions and the challenges of implementing successful natural restoration projects in these watersheds.



Instructor: **Jerry Davis**, SFSU Professor and a specialist in watershed geomorphology. We'll also spend a day with a restoration project specialist from Feather River Coordinated Resource Management, and a hydrologist from USGS. This class will present moderately technical information.



Prospective students are strongly urged to have taken an introductory physical geography or physical geology course. Class textbook will be *Stream Hydrology: An Introduction for Ecologists* by Gordon, Nancy D. *et al.*, 2nd Edition, if you can find a copy.

The first class meets Saturday July 23, at 3 pm. The last class is Saturday, July 30.

****Note:** more than half of this class will be held outdoors; rain, snow or shine. Storms are common in this region so participants should be prepared for any weather condition. Participants should use either hip waders or tevas for investigating channel elements.

To get more details about this class please email Jerry Davis at jerry@sfsu.edu.

For registration materials, contact:

Jim Steele jsteale@sfsu.edu

September - May: 650-738-1814

Or after the summer classes start in June:

J.R. Blair jrblair@sfsu.edu

June - August: 530-862-1230

Schedule

Geol 451, Sierra Nevada Field Campus, 23-30 July 2011

Date	Time	Topic/Activity	Reading
7/23 Sat	pm	Orientation & introduction	
7/24 Sun	am	Review of fluvial processes (lect/field)	Gordon
	pm		
7/25 Mon	am	Field Trip to N Yuba Canyon, Sierra Buttes, Gold Lakes areas: stream processes, glacial modification, fluvial response	Gordon, Rosgen, Montgomery- Buffington
	pm	Stream classification and assessment methods (lect/field)	
7/26 Tue	am	Sagehen Creek field trip, with Jeff Brown, Sagehen Director, and Paul Honeywell, USGS hydrological technician	Gordon
	pm		
7/27 Wed	am	Geomorphic survey/ reach characterization methods (lect/field)	Harrelson et al.
	pm	N Yuba River survey	
7/28 Thu	am	Carman Valley	
	pm	group projects	
7/29 Fri	am	Little Last Chance Creek and Sulphur Creek, with Leslie Mink,	
	pm	Feather River Coordinated Resource Management	
7/30 Sat	a.m.	survey & data compilation, produce report, map, cross sections, and longitudinal profile.	

Some course-specific items to bring with you:

The field campus recommends items to bring for camping, etc., but we have additional specific needs:

- Waders or Teva-type sandals suitable for wading in sometimes chilly water. I use tevas in these streams – get a little chilly after a long stint, but hey, it's summer.
- Waterproof field notebook. An important part of this class is making field sketches of the plan and sections we'll be investigating. We may have a few available for purchase, but it would be best to order one from <http://www.riteintherain.com/>. Lots of choices:
 - Stapled (like the metric field #361), spiral (like the #363), or bound. The stapled will squeeze into a pocket a bit better, but some people like the spiral. The bound books are thicker, with more than twice as many pages, and fit just as easily in a large pocket.
 - Page Pattern – some good choices are **metric grid**, **metric field**, **universal**, or **field**.
 - Size: most are 4 5/8" x 7" and thus fit in a big pocket. There are smaller pocket sized models, but they don't really provide enough room for sketches. There are also 8 1/2" x 11" books like the **#373-MX Universal** that seems like it would work quite well for a good sketch, with space for data and notes. You might also consider a clipboard and waterproof sheets.
- A laptop with Excel or other spreadsheet program is useful for processing field data, if you have one. If a few students have one, we should be ok.
- A small ruler with millimeter scale, for pebble counts.
- Mechanical pencil.

Riding from the Bay Area?

The instructor will be driving a van up from the Bay Area for the class. If anyone wants a ride, email at jerry@sfsu.edu.

Readings/Textbooks:

There will be a limited amount of time for reading during the course. I recommend one textbook, which you can order from Amazon, and there are also some reference materials and articles you should download and print for use during the week.

Recommended text:

Gordon, Nancy D., Thomas A. McMahon, Brian L. Finlayson, and Christopher J. Gippel (2004).

Stream Hydrology – An Introduction for Ecologists, 2d edition. Currently unavailable from Amazon in paperback, but they do have the hardback edition.

Optional:

Rosgen, David: Either *Applied River Morphology* or *Field Guide for Stream Classification*. Available for purchase from <http://www.wildlandhydrology.com/html/publish.htm>

References to download & print:

Harrelson, Cheryl, C. L. Rawlins and John P. Potyondy (1994). *Stream Channel Reference Sites: An Illustrated Guide to Field Technique*. <http://bss.sfsu.edu/jdavis/snfc/refs/referenceSites.pdf>

Various (mostly) Dave Rosgen references from Wildland Hydrology's web reference page. Peruse the available freely downloadable references at:

<http://www.wildlandhydrology.com/html/references.html> A few that look interesting are:

- *A geomorphological approach to restoration of incised rivers.*
- *The application of stream classification using the fluvial geomorphology approach for natural channel design: the rest of the story.*
- *Field survey procedures for characterization of river morphology.*
- *A practical method of computing streambank erosion rate.*
- *A stream channel stability assessment methodology.*
- *Measurement of bed load in rivers.*

Alternative Classification System:

Montgomery, David R., and John M. Buffington (1997). *Channel-reach morphology in mountain drainage basins*. *Geological Society of America Bulletin* (May) 109(5): 596-611.