

9-2013

## ENSC 540.01: Watershed CPR (Conservation, Preservation, Restoration)

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### Recommended Citation

Watson, Vicki J., "ENSC 540.01: Watershed CPR (Conservation, Preservation, Restoration)" (2013). *Syllabi*. 1.  
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**ENSC 540 Watershed CPR (Conservation, Preservation, Restoration) Fall 2013** **subject to change**  
Vicki Watson, 101 NS, 243-5153, [Vicki.watson@umontana.edu](mailto:Vicki.watson@umontana.edu) office hrs: noon-2pm, Wed usually

GOALS: To increase student understanding of watershed science, policy, actions & organizing with a view to increasing citizen participation in the stewardship of watersheds & training watershed professionals.

Sept. Introduction – 7 C's of Watershed CPR, Watershed CPR plans; grading/projects  
1<sup>st</sup> day Assignment: see Clark Fork Slide show ([www.umt.edu/clarkforkslideshow](http://www.umt.edu/clarkforkslideshow))

**Watershed Science – Connections, Condition, Changes, Capacity**

**Reading:** *Postel & Richter 03. Rivers for Life. Island Press. Ch 1 & 2.*

References: From most basic: **Streamkeepers Guide** Ch 1 & 2 (assessments ch 3-7)

To increasingly advanced – Entering the Watershed 93 (esp. exec sum & ch 3)

Naiman 92 Watershed Management (esp chs. 1, 3, 6)

Rosgen 96 Applied Stream Morphology (esp. ch 3 & 4) & Field Guide

Williams 97 Watershed Restoration (esp: chs 1, 5-8, 25)

**Naiman 99 River Ecology & Mgt** (esp: chs 1, 2-4, 5, (11, 12, 16), 18, 24, 26)

Online: **Stream Restoration Manual** (chs 1-3) [www.nrcs.usda.gov/technical/stream\\_restoration](http://www.nrcs.usda.gov/technical/stream_restoration)

EPA's online watershed courses at [www.epa.gov/watertrain](http://www.epa.gov/watertrain)

Clark Fork papers: [www.umt.edu/clarkforksymposium](http://www.umt.edu/clarkforksymposium)

Watershed Clinic web site: [www.umt.edu/watershedclinic](http://www.umt.edu/watershedclinic)

National River Restoration Science Synthesis (NRRSS) <http://nrrss.nbii.gov>

"Synthesizing U.S. River Restoration Efforts," E.S. Bernhardt, et al, Science, 29 April 2005:

[www.sciencemag.org/cgi/content/full/308/5722/636](http://www.sciencemag.org/cgi/content/full/308/5722/636)

Oct – **Watershed CPR – Actions** – (Field trips also serve to illustrate this – see field trip list)

References – see many web sites on web list (emailed)

Stream Restoration Manual (planning & design 4-8, implement 9, actions A)

On e-reserve: Aikens article (Blackfoot case study) from Watershed Restoration

Frissell's articles in Watershed Restoration & Naiman 99 (also ch 26)

In Watson lab: file of pamphlets & booklets on BMP's, restoration & management

NOTE: 2012 is 40 year anniversary of the Clean Water Act

Nov 1<sup>st</sup> half – **Watershed Law/Policy**—US & MT water laws/regs, water rights, nondegradation, TMDL law, definition of impairment & sufficient credible evidence of use support

**References: US law:** *Postel & Richter, Ch 3. Ch 22 of Naiman 99 (River Law)*

River Network's Understanding the Clean Water Act – [www.cleanwateract.org](http://www.cleanwateract.org)

ELI, 2008. State Wetland Protection: Status, Trends & Model Approaches

[www.elistore.org/reports\\_detail.asp?ID=11279](http://www.elistore.org/reports_detail.asp?ID=11279)

Brown, et al. 1993. Laws controlling nonpoint sources. Water Res Bull. 29(1):1-13. e-reserve

**MT Law:** Mt DEQ web site: [www.deq.mt.gov/wqinfo](http://www.deq.mt.gov/wqinfo) see Laws & Rules

Guide to Stream Permits <http://dnrc.mt.gov/permits/streampermitting/default.asp>

More guides -- Guide to MT WQ Regulations, MT Water Rights, Index of env permits,

SEE <http://leg.mt.gov/css/Publications/Environmental/default.asp>

TMDLs: [http://deq.mt.gov/wqinfo/TMDL/STAG/advisory\\_group.mcp](http://deq.mt.gov/wqinfo/TMDL/STAG/advisory_group.mcp)

Nutrient work group -- <http://deq.mt.gov/wqinfo/NutrientWorkGroup/default.mcp>

Nov, 2<sup>nd</sup> half – **Watershed Organizing/Funding – Communities, Choices, Commitment**

References: Chs. 21 & 25 of **Naiman 99**; Consensus Manual of MT Consensus Council;

Getting in Step—a Guide to Effective Outreach in your Watershed; Funding calendar

<http://water.montana.edu/funding/> watercenter.montana.edu <http://mtwatersheds.org/Resources/FundingDirectory.html>

Dec – **Student Presentations** Final meeting – Dec 10 (Mon) 10 - noon

**Guest Speakers/field trip leaders include: watershed coordinators, land trust managers, planners, fish biologists, mining reclamation engineers, restoration scientists, floodplain managers**

**Field trips: sign up lists in class or later at M2 Rankin; some listed on [www.umt.edu/conservationcalendar](http://www.umt.edu/conservationcalendar)**

**References** – Above references **in bold** are at library, online &/or available from me. See also Citations on ref list (emailed)

Many educational pamphlets/booklets are free or cheap (see examples in 102 Natural Science).

**Grading** –1 or 2 papers [proposal(s) 10 pts, outline(s)/biblio(s) 40pts, paper(s) 100 pts, presentation(s) 50 pts]

attend meeting of a conservation district, watershed group, or water quality district & summarize for class: 50 pts

participation in class and go on at least 2 field trips: 100 pts. Total possible points = 350 pts

**1-2 papers & presentation** worth 200 pts (10 for proposal, 40 for progress report, 100 for paper(s); 50 for presentation on one paper)  
 100 pts --**participation in class/field trips**; 50 pts--**report on relevant public meeting**; 50 pts--**report on class selected topic. 400 pts total.**

1) An academic paper (sort of a mini-**thesis**) that attempts to be an original creative work. It may involve carrying out an original study designed by you that collects data to answer a question or test a hypothesis. It may instead involve analyzing data collected by others, once again to answer a question or test a hypothesis. These data may come from government data files or appear in the open literature. Often you will be pulling together data from several sources and using it to answer a new question. The paper could also be a review paper on some topic, but it is often a challenge to be really creative and original with this approach.

Your goal is to advance our understanding of a subject (try to teach me & other academics something).

The paper should be publishable. You should identify a target publication and write the paper in its style.

It is wise to identify a model paper that accomplishes a similar goal to yours and ask if a paper with a similar goal/format/sophistication, etc is appropriate. Make use of refereed literature as well as other sources.

2) A more applied paper aimed at an off campus target audience (sort of a mini **professional paper**). You will act as a consultant to some off campus target audience. Identify a need and fill it. You might: investigate a subject and develop a position paper or action plan for them (based on scientific info and group's values); critique an EIS or other government decision; conduct a survey or other study that gathers/analyzes data; develop a curriculum or exercise for a teacher. Often this paper will address an issue that may be of local interest only; or address very site-specific questions (ie analyzing local data to address how a site should be managed, restored, etc). The level of sophistication depends on the target audience (but the science must be scientifically defensible).

The two papers can be on the same or different subjects. Either can be produced first. Often the timing needs of the applied paper may dictate this (there may be a deadline for comments, for example). **THE TWO PAPERS MAY BE COMBINED INTO A SINGLE PAPER IF IT CAN SATISFY THE GOALS OF BOTH.**

Length of paper(s): About 20 single spaced pages total (+/- 5) of original, well written, tightly crafted, no-wasted-words prose. These pages may be allocated between the two papers as you see fit. (Two 10 pp papers or one 15 pp and one 5 pp). Don't worry about the exact number of pages. It should be as long as it needs to be to address the question, explore the relevant literature, & treat the subject at the agreed upon level of sophistication. Don't put in unnecessary words or explanation to fill up space and don't cut it shorter than you feel necessary to fit into some length. The page guidance given above is to help you establish the scope of the paper. And also to remind you that not much that is longer than 10-20 pages ever gets read or published. If you wish to emphasize one paper over the other, you may negotiate for reappportioning points.

**Suggested Milestones** (negotiable). Can email me all assignments but the paper –that I need in hard copy & e-copy. Note: I will need at least a week to provide feedback after receiving something in writing.

**Week of course: if writing 2 papers, observe these milestones:**

3<sup>rd</sup> (Sept 12) —Proposal for first paper    6<sup>th</sup>(Oct 3) — Progress Report    8<sup>th</sup> (Oct 17) —First paper due  
 10<sup>th</sup> (Oct 31) —Proposal for 2<sup>nd</sup> paper    12<sup>th</sup>(Nov 14) — Progress Report    14<sup>th</sup>(Nov 28) —2<sup>nd</sup> paper due

**1 paper:** 3<sup>rd</sup> (sept 12)—Proposal; 8<sup>th</sup> (Oct 17)—progress report; 12<sup>th</sup> (Nov 14)—draft paper, 14<sup>th</sup> (Nov 28)—final paper  
 14-15 th week —Presentation on one of the two papers (you can negotiate for an earlier time)

**Proposal:** GIVE TITLE. Explain need for the project/paper: explain questions/hypotheses to be addressed.

Who is the target audience or target publication?

How will you address this question/hypothesis? What study design & methods?

What do you plan to produce and how can it be used?

What relevant resources have you located so far? What problems do you anticipate?

What is your timeline for milestones? (be specific to your project—dont give me my timelines)

Optional – but good practice: Discuss your qualifications for doing this work. Give a budget.

**Progress Report:** Explain any changes from original proposal; \*\*\*\* provide detailed outline of paper\*\*\*\*;

And a bibliography of the sources collected to date (use the CBE citation style; guide emailed on request).

**Paper:** Single space (double space between paragraphs). Double-sided preferred. Provide 2 copies: one to mark up & return; one for me to keep. Also an e-copy. **DO NOT EMBED** tables, figures, in text. Put them all at the end. If they are large, put them in a separate file. Keep formatting simple and easy to edit. NUMBER PAGES. If you write a single paper, a double spaced draft is due at least 2 weeks before final is submitted. Revise based on my comments.

**540 students must attend at least one water-related public meeting & report back to class. Some meeting possibilities are:**

Montana Watershed Coordination Council meetings ([mtwatersheds.org](http://mtwatersheds.org)), any watershed group's meeting, see <http://water.montana.edu/events/>  
 Milltown planning group ( meets monthly)

Msl Conservation district meets – 2<sup>nd</sup> Mondays; 7-9pm; USDA Service Center, 3550 Mullan Road (near Mullan Rd & Reserve).

.....Agenda, call 829-3395.

Msl Water Quality Advisory Council – 2nd Tuesdays , 7-9pm; City-County Health Dept. (301 W. Alder, Missoula; 2nd floor conference room).

.....For agenda, call 523-4890

Clark Fork Basin Task Force – meets monthly at DNRC or DFWP HQ on Spurgin Road. Next meeting: Sept 4

**Montana Watershed Symposium – Oct 15-17 in Missoula**

## EVST 540 Fall 2013 Field trips (\*UM vehicle going); See the Con Cal for lectures, meetings, workshops, etc

Unless a different place is specified, EVST field trips (\*) leave from the parking lot north of UM's UC (by the tennis courts). Students in EVST 105, 360 & 540 may register for a space in a UM van on a sign up list at Rankin Hall room M-2. Other UM students can ride in the UM van if there is space. Non-students need to provide their own transportation. Some Community group or government agency or other department field trips may count as field trips – get them approved & arrange your own transportation. For more info (time, location, contacts) on field trips, see -- [www.umt.edu/conservationcalendar](http://www.umt.edu/conservationcalendar)

- \* Aug 28 Wed (walk) & Aug 30 Fri (bike) **Clark Fork River sampling in town** – meet at 102 Natural Science at 2:10pm
- \* Aug 31, Sept 1-2, Sat-Mon, – **sampling on Clark Fork River**. arrange to ride with VW on any of these days (as space permits)  
Sept 7 & 8 –Stream Team Training; Sept 12, 15, 18 –stream monitoring volunteer training at Greenough Park pavilion  
See conservation calendar for times – note you need to RSVP [water@montanawatershed.org](mailto:water@montanawatershed.org)  
Sept 14-- Bitterroot River Cleanup  
Sept 13-14 – Missoula Hazardous Waste Collection Days (volunteers needed, great experience & counts for field trip hours)
- \* Sept 21, Sat – **Clark Fork Superfund tour**. meet at 8am at north end of Van Buren br. (East Gate parking lot). return 6pm.
- \* Sept 28 Sat – National Public Land Day (Restoration work in the morn at new **Milltown state park**)
- \* Oct 5, Sat – **Blackfoot Restoration Tour** – meet at 8am at north end of Van Buren Br. (East Gate parking lot). return 6pm.  
Oct 3-4 -- AWRA conference in Bozeman.  
Restoration Ecology field trips 9/7 Seed collecting at MPG Ranch; 9/28 Native Ideals seed farm & SK Green house; 10/13 Milltown  
See also field trips offered by Audubon, Sierra, Great Burn Study Group, etc on [www.umt.edu/conservationcalendar](http://www.umt.edu/conservationcalendar)

**Others field trips that will be organized (in Oct or Nov).**

- \* **Missoula Wastewater Treatment tour & Ekocompost** -- composts Missoula's sewage sludge; started by an EVST student!

**Project ideas** -- Assist Clark Fork Basin Task Force with work on new state water plan

Evaluate planned expansion of the poplar plantation land application project at wastewater plant & Frenchtown mill in light of EPA superfund assessment there.

Evaluate new DNRC rules on combined appropriations for Exempt wells.

**Clark Fork Coalition requests (from last year; check to see if still desired):**

CLIMATE/RESTORATION:

- a review of fisheries migrations upriver through Milltown since the 2008 removal of the dam (interview regional fish biologists)
- design and build a fish friendly irrigation diversion on the CFC's ranch and study the fish entrainment before and after.

WATER USE/HYDRO:

- a review of studies on materials used for conserving irrigation water, specifically the useful life and water-savings related to different kinds of pipe and ditch-liners.
- diversion inventory and flow study of the mainstem Clark Fork River during late August. Collect flows and temperature at various points from the headwaters to Missoula. Also, inventory and photograph all irrigation diversions and pumps. Take flow measurements above and below each diversion.
- return flow study of the West Side Ditch in the Deer Lodge Valley, and/or a general study of the impacts to the hydrology of the Deer Lodge Valley from changes in irrigation practices (flood to sprinkler conversions practices). Is flood irrigation really beneficial to the Clark Fork River? In what instances is it beneficial versus detrimental?

UPPER RIVER RANCHING COMMUNITY:

- survey of landowners in the UCF as to what type of projects or conservation practices they are interested in. Irrigation efficiency, diversion improvements, stock water tanks, riparian fencing?

POLICY/OUTREACH:

- survey Clark Fork anglers -- What are they catching and how much are they spending?
- "Cliff notes" version of the new Farm Bill, and how it will impact conservation programs in western Montana (i.e. funding for wetlands conservation, irrigation efficiency, etc)
- study supply and demand, as well as related rules/laws, for re-using effluent at wastewater treatment plants in western Montana for irrigation of non-human-consumed agriculture (alfalfa, trees, etc)
- help design a riparian volunteer corps that manages and maintains public and private open space near waterways (i.e. removing weeds in subdivisions). Work with the city, county, and partners to identify parcels and implement a monthly maintenance program.
- survey literature and reports to determine potential aquifer or drinking water contamination from septic systems

**New resource of interest**

EPA 2012 report on the Economic Benefits of Protecting Healthy Watersheds. EPA 841-N-12-004  
[http://water.epa.gov/polwaste/nps/watershed/upload/economic\\_benefits\\_factsheet3.pdf](http://water.epa.gov/polwaste/nps/watershed/upload/economic_benefits_factsheet3.pdf)