

ENVS 411: Ecological Restoration

Syllabus - Winter 2015, CRN 22176

I. Summary Information

A. Instructors

- Peg Boulay, Instructor, 541-346-5945, boulay@uoregon.edu
Office: 242 Columbia; Office Hours: 2:00 – 4:00 p.m. Wed and by appointment
- Davita Flowers-Shanklin, GTF, 414-899-7069, dflower4@uoregon.edu
Office: 47A Columbia; Office Hours: 10 – 11 a.m. Wed and 10 – 11 a.m. Fri

B. Meeting Times and Locations

Lecture: Wednesday 12:00 – 1:50 p.m.; 142 COL

Lab: Friday 1:00 – 4:50 p.m.; 101 PETR (unless otherwise specified)

C. Required Readings and Materials

We won't be using a textbook. Rather, required readings will include peer-reviewed journal articles, book chapters, gray literature and other materials. All readings will be available online and/or Blackboard. In addition, you will need a 4.5" x 7" (or similar size) Rite in the Rain[®] notebook (mandatory; available at UO bookstore). Do not purchase a smaller notebook (e.g., 3" x 4.5").

D. Key Dates

1/16	Fri	Partner/Planning Worksheet Section 1 draft due
1/23	Fri	Partner/Planning Worksheet completed final due
1/30	Fri	Literature Search due
2/18	Wed	Literature Synthesis due
2/25	Wed	Case Study due
3/4	Wed	Field Notebook due
3/11	Wed	Project Proposal (grant application) due
3/19?	Thur	Final <i>Please check DuckWeb later in term</i>

E. Course Website

We will be using Blackboard as a means of communication and coordination. Visit our Blackboard site regularly throughout the term for announcements, handouts, syllabus, lecture outlines or notes, and other information.

II. Course Overview and Objectives

In the Environmental Leadership Program's (ELP) "Conservation Science in Action" (CSA) projects, students collect, use, and share information to assist our community partners with habitat restoration, management planning, policy development, species conservation, conservation outreach and other needs. This course is designed to prepare ELP students for their spring projects by introducing you to your team, community partners, project background and methods.

The Riparian Restoration and Stream Stewardship CSA projects relate to one or more stages in the adaptive process of ecological restoration. Ecological restoration is a relatively new – but rapidly growing – interdisciplinary field of applied study. It is the science and art of attempting to recover the ecological function of ecosystems degraded by human activity. During this course, students will apply ecological theory to restoration practice, learn about underlying causes that damage ecological integrity, consider how people intervene to address these causes, and explore some of the scientific and social aspects of restoration ecology. We will examine the entire process of restoration: assessment, planning, implementation, maintenance, monitoring and communicating results. We will use local case studies and field investigations to explore some of the goals, methods, challenges, successes, failures and other lessons learned. The ELP projects use common techniques to address current conservation issues, so these case studies are relevant to our course work regardless of your affiliation with a particular ELP project. In addition, we will practice some fundamental skills that all field-based environmental scientists should know. And we will get our hands dirty helping by implementing a small-scale restoration project at Whitewater Ranch.

This course is focused on riparian and oak restoration in the Marine West Coast Forest Level I/II Ecoregion (e.g., maritime-influenced rainforests of coastal California, western Oregon and Washington, and portions of Alaska and British Columbia), with an emphasis on the Willamette Valley and Cascades Level III Ecoregions. For more information on ecoregions (and cool maps!), see http://www.epa.gov/wed/pages/ecoregions/na_eco.htm. However, many of the concepts in this course can be applied to other ecosystems and regions.

Course Philosophy and Learning Objectives

Active, engaged participation is central to this course. We, as a group, will be responsible for the learning that occurs. That means you are responsible for doing all the reading before class, coming to the class on time and prepared for critical discussion, and sharing your insights, perspectives and experiences to enrich the discussion. Through active engagement in the course activities and reading materials, you will be able to:

- Discuss the interdisciplinary nature of ecological restoration, citing examples from the natural sciences, social sciences and/or humanities.
- Describe each stage of the adaptive management process (e.g., assess, plan/design, implement, monitor, evaluate, adjust), illustrating your statements with specific examples.
- Discuss how ecological theory informs the conceptual models that underlie restoration planning and practice.
- Analyze several case studies to articulate common themes in restoration goals, methods, challenges, successes, failures and other lessons learned.
- List important considerations for plant material selection, site preparation, invasive species control, plant establishment and site maintenance.
- Describe and/or demonstrate several methods for monitoring restoration projects.
- Search for, read, interpret, and synthesize scientific literature.
- Communicate your ELP project goals and methods in the form of a project proposal.
- Apply listening, communicating, collaborating and other interpersonal skills essential to working within team settings.

III. Class Activities, Evaluation and Grading

Note: We will post test scores and assignment grades on our Blackboard website. If you believe that we made a data entry error or that you deserve more points on an assignment or exam question, submit a brief explanation of the situation in writing within one week of the scores being posted.

A. Logistics and Standards

- **Submitting Assignments.** To save paper, we will use Blackboard (for submitting and returning assignments) and the editing function in Word (for feedback). Unless otherwise instructed, submit all assignments via Blackboard. Please complete your assignments in Microsoft Word or a compatible word processing program (generally, open access software works fine); do not submit assignments as a pdf. Name your file with your first name and assignment title (e.g., Boulay_Synthesis.docx). All assignments are due at the beginning of class.
- **Late assignments.** Late assignments will be penalized 5% if turned in late on the due date, then 5% every calendar day, up to one week after the original due date. To submit a late assignment, simply use Blackboard. If you need to submit a hard copy (e.g., your Field Notebook), take it to the Environmental Studies office (144 Columbia Hall), ask Taylor or a Student Adviser to record the date/time and sign it, and place it in my mailbox. Except for emergencies, no assignments will be accepted after one week.
- **Determination of course grade.** Grading will be based on points: A = 450 – 500 pts (90–100%), B = 400 – 459 pts (80–89.9%), C = 350 – 399 pts (70–79.9%), D = 300 – 349 pts (60–69.9%), F = ≤ 299 pts (< 60%).
- **Two Key Points.** 1) For each assignment, you will be given a handout that explains the assignment goals, requirements and grading approach. 2) Poor participation in team assignments will affect both the assignment grade and your class participation grade. Lack of participation in team assignments will result in a “0” for the assignment.

B. Summary of class activities and grading.

Activity	Type of Activity	Total Points	Percent of Grade
Participation	Individual	20	4%
Homework: Community Partner/Planning Worksheet			
Section I	Individual	20	4%
Complete Worksheet	Team	40	8%
Homework: Case Study	Individual	50	10%
Quizzes on Readings (n = 5)	Individual	50	10%
Field Notebook	Individual	40	8%
Project Proposal (grant application):			
<i>Literature Search</i>	Individual	40	8%
<i>Literature Synthesis</i>	Individual	60	12%
<i>Final Proposal</i>	Team	80	16%
Final Exam	Individual	100	20%
Total Points		500	100%

1. Participation: class meetings, required Friday labs/field trips. Your attendance and active participation in class activities will provide you with a greater understanding of the material than can be gained by doing the reading on your own, by talking to someone who attended class, or by reading lecture materials on the class website. Factors that contribute to a high participation grade include: being prepared for and arriving on time for class sessions, being fully engaged during class activities, sharing your insights on the class material, asking questions when you do not understand a concept, respectfully listening to others' viewpoints, and doing your part to keep exercises and discussions focused and on track.

This is a field-based, hands-on course. The Friday labs/field trips are a critical part of this course; your attendance is required and will factor into your participation grade. If a scheduling conflict, illness or unforeseeable emergency forces you to miss a field trip, let me know as soon as possible and we will work out an alternate approach. You are required to make up missed field trips.

Dress for success! (“*There is no bad weather, only inappropriate clothing.*” – *anonymous*). Unless otherwise indicated, the Wednesday lectures will be indoors. The Friday labs will almost always involve at least some time outside, even on days when we don't have field trips. Since this is Oregon, we can expect to get cold and/or wet. Please dress appropriately to keep yourself warm and dry. Dress in layers and bring raingear, gloves, hat and appropriate footwear. What else to bring on field trips: your Rite in the Rain[®] field notebook, **2** pencils (not pens), and water bottle. Optional: umbrella, sunglasses, binoculars, magnifying hand lens, snacks, and personal field plant or animal identification guides.

2. Homework: Community Partners and Project Planning Worksheet. This two-stage assignment is designed to familiarize you with your ELP community partner(s), project goals and your teammates. It will also allow you to begin planning your project as a team.

3. Homework: Case Study. The purpose of this assignment is to allow you to explore your personal interests related to ecological restoration and to gain an in-depth understanding one case study through the lens of natural sciences, social sciences or humanities.

4. Quizzes on Readings. The readings provide critical background for class activities. Throughout the term, short quizzes will be given at the beginning or end of the class. The quizzes will be unannounced and will cover the assigned reading for that class. Only the best 5 quizzes will be counted; the lowest quiz grade(s) will be dropped. No makeup quizzes will be given; if you need to miss a quiz, it will be one of your quiz grades to be dropped.

5. Field Notebook. The purposes of this assignment are to encourage you to take good notes during field trips, to demonstrate the importance of keeping field records during restoration projects, and to allow you to create your own personal system of recording field notes. Because much of our content will come from field work, your Field Notebook will be an important resource for studying for exams. For the Field Notebook assignment, you are required to have a 4.5" x 7" (or similar size) Rite in the Rain[®] notebook.

6. Project Proposal. In Oregon, many – if not most – restoration projects are funded through grants, so grant writing is an important skill for a restoration practitioner. Through individual and team sub-assignments, you will write a streamlined grant proposal for your ELP project, using the Oregon Watershed Enhancement Board grant application form. This assignment will allow you to hone your scientific writing skills as you prepare for your project by becoming familiar with relevant literature, completing critical background reading, thinking carefully about your methods, becoming familiar with your site(s) and creating content that can be used during spring term. This project will be completed in stages: Literature Search, Literature Synthesis, and Project Proposal/Grant Application.

7. Final Exam. The final exam will ask you to synthesize information covered throughout the course. The exam will emphasize applying concepts rather than remembering details. Exam questions will be primarily essay format. You will be given a study guide and we will have an in-class review session.

V. Classroom Conduct and Academic Honesty

This syllabus describes the roles and expectations for each of us during the course. If you have questions or concerns about any of the course requirements, please let me know as soon as possible.

I support the use of computers to take notes. However, please show respect to your instructors and fellow students by not checking email/social media or surfing the web during class. Such actions can be a distraction to your peers. Do not check email or text via your phone during class.

I expect everyone to strictly adhere to the University Student Conduct Code and University policies regarding academic misconduct (see the UO Office of the Dean of Students website, <http://uodos.uoregon.edu/StudentConductandCommunityStandards/AcademicMisconduct/tabid/248/Default.aspx>). **All work submitted for this course must be your own and be written exclusively for this course.** You must properly acknowledge and document all sources of information (e.g., quotations, paraphrases, ideas). In this course, we will discuss proper methods for evaluating, using and citing reference material. “Cutting and pasting” from the internet is essentially stealing intellectual property and will not be tolerated. For tips on deciding whether you need to cite a source, see <http://library.uoregon.edu/guides/plagiarism/students/index.html>. If there is any question about whether an act constitutes academic misconduct, it is your obligation to clarify the question with me before submitting your work. If you plagiarize, you will receive an F for the assignment or entire course (depending of the severity of the situation), and you’ll be referred to Office of Academic Affairs.

VI. Notes on Attendance and Inclement Weather

Your attendance is expected and part of your grade. However, please tell me if you are having significant problems that interfere with your ability to attend or do work in this course. Depending on the situation, I am willing to give you an incomplete or to make special arrangements to allow you to complete your work. However, please realize that an “Incomplete” grade in this course may preclude your participation in your spring ELP project. Please ensure that your need is real and unavoidable, that you have done your best to deal with the situation, and that you inform me about it as soon as is practically possible.

This class will meet rain or shine unless the University is officially closed for inclement weather or if snow, ice or other winter conditions prevent safe travel by van. If I need to cancel class for any reason, I will post an announcement on Blackboard and through Blackboard's email system.

VII. Inclusive Learning and Academic Access

If you have a disability (physical or learning), medical condition, or other situation that you think may affect your performance in this class, please see either me or Davita during the first week of the term so that we can make arrangements, if necessary, for your full access to all classroom activities. You may also wish to contact Accessible Education Center in 164 Oregon Hall at 346-1155 or uoaec@uoregon.edu.

The University of Oregon strives to create inclusive learning environments. Here are some additional resources:

- The UO Bias Response Team (BRT) works to gather information about bias incidents and to support those who unfortunately have witnessed, or themselves become a target, of an act of bias. BRT also provides educational programming and campus presentations. Email: brt@uoregon.edu, website: <http://bias.uoregon.edu/index.html>
- The Mills International Center is a resource for the UO community—including faculty, staff, international students, and domestic students—to share their cultural diversity. It is located in the EMU and open 9 a.m. – 9 p.m. Mon-Fri, <http://international.uoregon.edu/mills> and www.facebook.com/UOMills.

Winter 2015 Class Schedule

This is a relatively new course, so the schedule is subject to adjustments. The assignment dates will not change, but topics covered in each class may shift. Hint: if links don't work due to wrapped text, try pasting the link into the navigation bar of your browser. Note: these are abbreviated citations and not the format to follow for your assignments.

Wk	Date	Topics	Readings	Due Dates
1	C1 – 1/07	- ELP/course overview - Introduction to ecological restoration - Taking field notes/ keeping a field notebook	1. Clewell, A. F., and J. Aronson. 2013. Ecological restoration: principles, values, and structure of an emerging profession. <i>Pages 3-13 (Ch. 1 Overview)</i> . 2. Roni, P., and T. Beechie. 2013. Introduction to restoration: key steps for designing effective programs and projects. <i>Pages 1-10 (Ch 1 in Roni, P., and T. Beechie, editors. Stream and watershed restoration: a guide to restoring riverine processes and habitats)</i> . 3. Greene, E. 2011. Why keep a field notebook? <i>Pages 256-270 (part of Ch 12 in M. R. Canfield, editor. Field notes on science and nature)</i> .	
	C2 – 1/09	Field Trip: Green Island <i>Guest: Chris Vogel, McKenzie River Trust</i>	1. Lane Council of Governments. 2011. Green Island Management Plan. Unpublished report prepared for McKenzie River Trust. <i>Pages 15-73 (Ch 2.0-5.0)</i> .	<i>Field notes required</i>
2	C3 - 1/14	- Introduction to ecological restoration cont. - Community models & ecological theory	1. Clewell, A. F., and J. Aronson. 2013. <i>Pages 15-27 (part of Ch 2 Values and Ecological Restoration)</i> . 2. Howell, E. A., J. A. Harrington, and S. B. Glass. 2012. Introduction to restoration ecology. <i>Pages 31-64 (Ch 2 The Community Model)</i> .	
	C4 - 1/16	- Partner presentations - GPS (weather allowing)	1. Community Partner websites (see Partner/Planning Worksheet assignment description). 2. Garmin: What is GPS? http://www8.garmin.com/aboutGPS/ .	Due: Partner/ Planning Worksheet (section I)
3	C5 - 1/21	- Finding, using and citing scientific literature - Adaptive restoration and ecological references	1. Dean Walton's Search Strategies for Environmental Studies, http://libweb.uoregon.edu/guides/envstudies/ 2. Howell, E. A., J. A. Harrington, and S. B. Glass. 2012. Introduction to restoration ecology. <i>Pages 65-94 (Ch 3 Adaptive Restoration)</i> . 3. Clewell, A. F., and J. Aronson. 2013. <i>Pages 137-153 (Ch. 7 Ecological References)</i> . 4. The Freshwater Trust. 2013. Reference site selection and data collection protocols for water quality trading projects. <i>Read pages 1-4 only</i> .	
	C6 – 1/23	Field Trip: South Eugene Meadows - Oak ecology and restoration - Sylvicultural measurement methods <i>Guest: Emily Steel, City of Eugene</i>	1. Watch these videos, http://vimeo.com/43211144 and http://www.kmtr.com/news/local/Eugene-park-project-puts-helicopter-to-work-262575791.html . 2. City of Eugene Handout: South Eugene Meadows (4 pages). 3. Hosten et al. 2006. Oak woodlands and savannas. <i>Pages 63-96 (Ch 4 in Apostol, D., and M. Sinclair, editors. Restoring the Pacific Northwest)</i> . 4. Husch, B., T.W. Beers, J.A. Kershaw, Jr. 2003. Forest Mensuration. <i>Read the following pages in Ch 5 Individual Tree Parameters: p. 81-91 (5-1 Age and most of 5-2 Tree Diameters and Areas); p. 113 – 117 (5-5.1 Crown Diameter and Area)</i> .	<i>Field notes required</i> Due: Homework - Partner/ Planning Worksheet (final)

Wk	Date	Topics	Readings	Due Dates
4	C7 - 1/28	- Site inventory and analysis - Overview: Planning - Overview: Riparian ecology and restoration	1. Howell, E. A., J. A. Harrington, and S. B. Glass. 2012. Introduction to restoration ecology. <i>Pages 95-139 (Ch 4 Site Inventory and Analysis)</i> . 2. Apostol, D., and D. R. Berg. 2006. Riparian woodlands. <i>Pages 122-149 (Ch 6 in Apostol, D., and M. Sinclair, editors. Restoring the Pacific Northwest)</i> .	
	C8 – 1/30	Using spatial data in restoration assessment and planning: - aerial photo interpretation - MAP Library tour - Google Earth	1. Paine, D. P., and J. D. Kiser. 2012. Aerial photography and image interpretation. <i>Pages 280-291 (Ch 15 Principles and techniques of aerial image interpretation)</i> . 2. Baillie, M. B., N. L. Salant, and J. C. Schmidt. 2011. Using a historical aerial photograph analysis to inform trout habitat restoration efforts. <i>Earth Surface Processes and Landforms</i> 36 :1693-1702.	Due: Literature Search
5	C9 - 2/4	- Riparian Restoration – technical aspects - Scientific writing	1. Withrow-Robinson, B., M. Bennett, and G. Ahrens. 2011. A guide to riparian tree and shrub planting in the Willamette Valley: steps to success. EM 9040. Oregon State Extension Service, Corvallis, Oregon. Available from http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/24003/em9040.pdf?sequence=1 . 2. Discover blog entry: http://blogs.discovermagazine.com/notrocketscience/2010/04/07/gut-bacteria-in-japanese-people-borrowed-sushi-digesting-genes-from-ocean-bacteria/ . <i>Read abstract and first paragraph of the original article:</i> http://www.nature.com/nature/journal/v464/n7290/full/nature08937.html (<i>Look at the figures, too</i>).	
	C10 – 2/6	Field trip: Whitewater Ranch #1	1. Browse the Whitewater Ranch website http://www.whitewaterranch.com/ , and watch the River Stories video: Three Million Neighbors: Conservation and Organic Farming at Whitewater Ranch. http://www.youtube.com/user/elpriverstories 2. Luna T., R. K. Dumroese and T. D. Landis. 2006. Collecting dormant hardwood cuttings for western riparian restoration projects, http://www.fs.fed.us/t-d/pubs/htmlpubs/htm06242334/index.htm and http://www.fs.fed.us/t-d/pubs/htmlpubs/htm06242334/page01.htm . Optional: Kim, K. D., K. Ewing, and D. E. Giblin. 2006. Controlling <i>Phalaris arundinacea</i> (reed canarygrass) with live willow stakes: a density-dependent response. <i>Ecological Engineering</i> 27 :219-227.	Field notes required

Wk	Date	Topics	Readings	Due Dates
6	C11 – 2/11	Human Dimensions of Ecological Restoration (Restoration and Culture) <i>Guests: Davita Flowers-Shanklin, others TBD</i>	<ol style="list-style-type: none"> 1. Newman, A. 2011. Inclusive urban ecological restoration in Toronto, Canada. <i>Pages 63-75 (Ch 5) in Egan et al., editors. Human dimensions of ecological restoration.</i> 2. Senos, R., F. K. Lake, N. Turner, and D. Martinez. 2006. Traditional Ecological Knowledge and restoration practice. <i>Pages 393-426 (Ch 17) in Apostol, D., and M. Sinclair, editors. Restoring the Pacific Northwest.</i> 3. Graham, J. 2014. Taking Root. Oregon Quarterly, http://www.oregonquarterly.com/taking-root. <p>Optional:</p> <ol style="list-style-type: none"> a. Watch this video, http://www.kcby.com/news/104880464.html b. Karten, R. 2013. Tribe dedicates Tyee Nature Reserve, http://www.grandronde.org/news/articles/tribe-dedicates-tyee-nature-reserve/. c. Kimmerer, R. 2011. Restoration and reciprocity: the contribution of Traditional Ecological Knowledge. <i>Pages 257-276 (Ch 18) in Egan et al., editors. Human dimensions of ecological restoration.</i> 	
	C12 – 2/13	Field Trip: BWCA - Pacing & vegetation monitoring	<ol style="list-style-type: none"> 1. Read about the Berggren Watershed Conservation Area, http://mckenzieiver.org/protected-lands/owned-properties/berggren-watershed-conservation-area/. 2. 2013 ELP Riparian Planting Monitoring Protocol. 3. The Freshwater Trust. 2014. Revegetation monitoring protocol for water quality trading projects. <i>Pages 1-10.</i> 	<i>Field notes required</i>
7	C13 – 2/18	- Oregon Plan for Salmon and Watersheds; overview of watershed councils - Grant writing overview	<ol style="list-style-type: none"> 1. Flitcroft, R. L., D. C. Detric, C. L. Smith, C. A. Thieman, and J. P. Bolte. 2009. Social infrastructure to integrate science and practice: the experience of the Long Tom Watershed Council. <i>Ecology and Society</i> 14:36. 2. New York Department of Conservation. No date. Tips for writing grant applications for watershed restoration and protection. <i>Pages 5-15</i>, http://www.dec.ny.gov/docs/water_pdf/granttips3.pdf 	Due: Literature Synthesis
	C14 – 2/20	Field Trip: Whitewater Ranch #2	<ol style="list-style-type: none"> 1. Review: Withrow-Robinson et al. 2011 (from 2/4). 2. Guillozet, P., K. Smith, and K. Guillozet. 2014. The rapid riparian revegetation approach. <i>Ecological restoration</i> 32:113-124. 	<i>Field notes required</i>
8	C15 – 2/25	Monitoring overview: - Designing a monitoring program: overview, types, parameters, scale	<ol style="list-style-type: none"> 1. Roni, P., M. Liermann, S. Muhar, and S. Schmutz. 2013. Monitoring and evaluation of restoration actions. <i>Pages 254-268, 273-279 (part of Ch 8 in Roni, P., and T. Beechie, editors. Stream and watershed restoration: a guide to restoring riverine processes and habitats).</i> 2. Elzinga, C. L., D. W. Salzer, J. W. Willoughby, J. P. Gibbs. 2001. Monitoring plant and animal populations. <i>Pages 4-7 (part of Ch 1 Introduction), 33-36 (part of Ch 3 Selecting Among Priorities).</i> 	Due: Case Study
	C16 – 2/27	Field Trip: Whitewater Ranch #3	No readings	<i>Field notes required</i>

Wk	Date	Topics	Readings	Due Dates
9	C17 - 3/4	Monitoring continued: - Quality Assurance/ Quality Control (QA/QC) - Qualitative techniques, photopoint monitoring, more on aerial photos <i>Guest: Jenna Duffin, UO Dept of Geography</i>	1. Oregon Watershed Enhancement Board. 1999. Water quality monitoring technical guide book. <i>Pages 4.1-4.4 (Ch 4)</i> , http://www.oregon.gov/OWEB/docs/pubs/wq_mon_guide.pdf . 2. Elzinga, C. L., D. W. Salzer, J. W. Willoughby, J. P. Gibbs. 2001. Monitoring plant and animal populations. <i>Pages 38-44 (part of Ch 4 Qualitative Methods) and 55-59 (part of Ch 5 General Field Techniques)</i> . 3. Hamilton, R. No date. Photopoint monitoring, http://www.fs.fed.us/eng/rsac/invasivespecies/documents/Photopoint_monitoring.pdf . Optional: Elzinga, C. L., D. W. Salzer, J. W. Willoughby, J. P. Gibbs. 2001. <i>The rest of Ch 5 General Field Techniques</i> .	Due: Field Notebook
	C18 – 3/6	Field Trip: BWCA - Vegetation monitoring cont.	1. <i>Reread</i> The Freshwater Trust. 2014. Revegetation monitoring protocol for water quality trading projects.	
10	C19 - 3/11	Monitoring continued - Animal monitoring overview - Monitoring aquatic macroinvertebrates and fish	1. Elzinga, C. L., D. W. Salzer, J. W. Willoughby, J. P. Gibbs. 2001. Monitoring plant and animal populations. <i>Pages 38-44 (237-241 (part of Ch 13 animal monitoring))</i> . 2. Murdoch et al. 1999. Streamkeeper's field guide. <i>Pages 118-138 (part of Ch 6 The Spineless Ones)</i> . 3. Thurow, R. F. 1994. Underwater methods for study of salmonids in the Intermountain West. <i>Pages 3-12</i> , http://www.fs.fed.us/rm/pubs_int/int_gtr307.pdf . 4. McKenzie Watershed Council's fish anatomy handout. Optional: Watch: Native Bumblebees, 2008 (8 min), http://www.opb.org/programs/ofg/segments/view/1684?q=bumblebees .	Due: Project Proposal
	C20 - 3/13	Field Trip: City of Eugene Native Plant Nursery - Plant materials - Synthesis and review <i>Guest: Lori Holts, City of Eugene</i>	1. Ward K., M. Gisler, R. Fiegenger, and A. Young. 2008. The Willamette Valley Seed Increase Program: developing genetically diverse germplasm using an ecoregion approach. <i>Native Plants Journal</i> 9 :334–350. 2. Society for Ecological Restoration. 2004. The SER international primer on ecological restoration. Optional: Neilsen-Pincus, M., and C. Moseley. 2013. The economic and employment impacts of forest and watershed restoration. <i>Restoration Ecology</i> 21 :207–214.	
11	TBA	Final Exam	Study!	