FSH 428 Spring 2019

Stream and Watershed Restoration

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Office Hours: Wednesdays 2:30 - 3:30pm, FISH 129

Meeting Times and locations

Mondays and Wednesdays 12:30pm-2:20pm

FSH 109 (lecture hall) and FSH 207 (computer lab)

Field trips April 13 and May 4 (8am-5pm)

Course Objective

To teach students the principles of aquatic restoration through lectures, discussion, case studies, and field trips.

Course Description

The degradation of aquatic ecosystems has led to massive efforts to restore streams, rivers, lakes, and estuaries throughout the world. These efforts have met with varying levels of success often due to misunderstanding of ecological principles and watershed processes, poor design and implementation, and inadequately designed monitoring. In this course we will not only provide students with an overview of restoration principles and techniques, but with the knowledge and skills to assess ecosystem conditions, identify and prioritize restoration opportunities, and evaluate them from a scientific and economic perspective. We will do this through a combination of lectures, case studies, written assignments, class projects, and field trips.

Upon completing the course students will be able to:

- Assess current and historical watershed conditions
- Determine areas in need of restoration and protection
- Develop multiple approaches for prioritizing watershed restoration projects
- Develop rigorous restoration monitoring and evaluation programs
- Develop a watershed restoration plan

Course Syllabus

Jump to Today ✎ Edit

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2019 Course Schedule and Readings

Week 1	Lecture	Required Reading	Assignment
April 1	Class overview, & expectations (Roni) Introduction to restoration (Roni)	Chapter 1	

April 3	Salmon life history (Pess) Limiting factors (Pess)	Bjorn et al. 1991	
Week 2	**Lecture**	**Required Reading**	**Assignment**
April 8	**Computer Lab** – Limiting Factors (Beechie)	Beechie et al. 1994	*Assignment 1 – Limiting Factors (problem set) assigned*
April 10	Watershed scale processes (Beechie) Reach scale processes (Beechie)	Chapter 2	
April 13 (Saturday)	**Field trip** – Stillaguamish and Sauk (Beechie, Pess, Roni)	Beechie et al. 2001	
Week 3	**Lecture**	**Required Reading**	**Assignment**
April 15	**Computer Lab** – Assessments – Sediment (Beechie, Computer Lab) Work on assignment	Chapter 3 (p. 50-78)	**Assignment 1 due** *Assignment 2 – Riparian & Sediment Assessments (problem set) assigned*
April 17	**Computer Lab** – Assessments – Riparian – (Beechie, Computer Lab) Work on assignment	Chapter 3 (p. 79–104)	
Week 4	**Lecture**	**Required Reading**	**Assignment**

April 22	**Computer Lab** – Synthesis and identification of restoration actions (Beechie) Exercise: developing a restoration goal	Chapter 3, Beechie et al. 2008	**Assignment 2 due** *Assignment 3 – Watershed Synthesis (report) assigned*
April 24	**Computer Lab** – Restoration techniques and their effectiveness (Roni) Additional work on synthesis	Chapter 5	
Week 5	**Lecture**	**Required Reading**	**Assignment**
April 29	Prioritizing restoration projects (Roni) Economic considerations and regional examples of prioritization (Fonner)	Chapter 6, Plummer 2005	*Assignment 4 – Prioritization (problem set) assigned*
May 1	Climate change (Beechie) Prioritization group exercise (Roni)		**Assignment 3 due**
May 4 (Saturday)	**Field Trip** – Floodplain & Estuarine Restoration		

Week 6	**Lecture**	**Required Reading**	**Assignment**
May 6	Developing a restoration project proposal (Pess) Restoration Design using River Rat (Pess) In class exercise – rating proposals	Chapter 7, 9 (section 9.3)	*Assignment 5 – Proposal (report) assigned*
May 8	Riparian Restoration (12:30 Susan Buis) Elwha River (Pess)	TBD	**Assignment 4 due**
Week 7	**Lecture**	**Required Reading**	**Assignment**
May 13	Stakeholder involvement (Dr. Jon Souder) Lacustrine restoration (Dr. Daniel Schindler)	Chapter 4	
May 15	**Computer Lab** – Monitoring restoration (Roni) Monitoring analysis (Roni)	Chapter 8	**Assignment 5 due**
Week 8	**Lecture**	**Required Reading**	**Assignment**

May 20	**Computer Lab** – Monitoring parameters and sample size – (Roni)	Liermann & Roni 2008	*Assignment 6 – Monitoring Plan (report) assigned*
May 22	Nearshore or Estuarine monitoring (Dr. Stuart Munsch) Snohomish Estuarine restoration (Jason Hall and/or Josh Chamberlin)		
Week 9	**Lecture**	**Required Reading**	**Assignment**
May 27	Holiday		
May 29	Lecture -- Giving effective scientific presentations (Roni) Group work on presentations	Reardon 1999, Fraidenburg 2005	**Assignment 6 due** *Assignment 7 – Oral Presentation assigned*
Week 10	**Lecture**	**Required Reading**	**Assignment**
June 3	Oral presentation practice	Pickett et al. 1991, Chapter 9	
June 5	Oral presentations		**Assignment 7 due**

Required Text and Readings:

Roni P. and T. Beechie. 2013. Stream and watershed restoration: a guide to restoring riverine processes and habitats. Wiley Blackwell.

Supplemental Readings: posted on course website

Assignment Overview

The 7 assignments required for this course are a mix of quantitative analyses (problem sets) and synthesizing these analyses (papers). Each assignment will build on previous assignments. You will be performing baseline analyses of habitat degradation and species loss in a study watershed, then synthesize these to identify the most important impacts and determine where to focus restoration efforts. From a list of possible actions, you'll choose the most effective actions, then write a proposal and create a monitoring plan for your restoration actions once they are implemented. Finally, you will give a group oral presentation of your restoration recommendations to a 'funding board' for consideration. These assignments are designed to be as similar as possible to real tasks that restoration scientists perform – and they are derived from real work your instructors have done in their own careers. In all of these assignments, you will be diving deeply into the detail and the species of one specific Puget Sound watershed, but the lessons about approaching a restoration project will be broadly applicable.

Grading

Assignment	Points
Assignment 1 – Habitat assessment	100 points
Assignment 2 – Riparian & sediment	100 points
Assignment 3 – Watershed synthesis	100 points
Assignment 4 – Prioritizing actions	100 points
Assignment 5 – Proposal	100 points
Assignment 6 – Monitoring plan	100 points
Assignment 7 – Group oral presentation	100 points
Field trips/class participation	100 points
Total points possible	800 points

Late assignments – We will deduct 5 points from your assignment grade for each day, including weekends, your assignment is late.

Problem Sets (Assignments 1, 2 & 4)

Each problem set will include three to five problems or questions that will require analysis, presentation of results, and interpretation of results. Problem sets grades are based upon whether you used the correct methodology (40 points), arrived at the correct answers (20 points) and the overall interpretation of results (40 points).

Papers (Assignments 3, 5, & 6)

Each writing assignment must be written in typical scientific format and include an introduction, methods, results, discussion, references, and tables and figures. We will provide detailed point breakdown and guidance for each assignment. Below is some general guidance on what to include in each section of your paper. Text should be double-spaced.

Introduction

The introduction should cover: 1) what is known about the problem and previous work, 2) what is the data gap/problems we need to fill/solve and 3) describe what the paper will cover (For example - In this paper we will…)

Methods

The methods should describe 1) the study area (geology, topography, climate, species, and human impacts), 2) the methods of data collection and 3) methods of data analysis.

Results

This section should describe the results of the analysis and provide only facts. Interpretation of results is in the discussion and thus there should be no citations in the results.

Discussion

The Discussion is where one interprets the results, compares them with other related studies, and discusses their significance and management implications.

Tables and Figures

Tables and Figures enhance the understanding of the material presented. They are a more efficient way to convey information than a verbal description. Both Tables and Figures must be accompanied by explanatory captions that allow them to “stand alone” – which means the caption provides enough information that the

figure can be understood by someone who has not read the whole report. Please do not repeat in the text the information in Tables and Figures, but do cite them within, with a summary statement when that is appropriate. Tables and Figures in the Methods section describe details of study location and Methods and in the Results section to provide additional detail on results not provided in the text.

References

You must cite another researcher whenever you refer to his or her results, conclusions, or methods in your paper. For the purpose of this course, please use the standards of American Fisheries Society. **http://www.fisheries.org/docs/pub_style9.pdf** **(http://www.fisheries.org/docs/pub_style9.pdf)** for citations in the text and in the References section.

Additional guidance for formatting scientific papers

The following sites provide additional detail on what to include in sections of a scientific paper:

http://www.bms.bc.ca/resources/library/pdf/GuidelinesScientificPapers.pdf

http://fisheries.org/docs/pub_tafs.pdf **(http://fisheries.org/docs/pub_tafs.pdf)** (see pages 318 to 320)

Group Oral Presentations (Assignment 7)

Each group of four or five students will have 25 minutes to give a group presentation of their comprehensive watershed restoration plan based on the four assignments. Each person must present a portion of the talk. How much you speak and what section is group determined. The presentation will be worth 100 points and is a group performance grade.

Grading for Oral Presentation

Overall presentation organization	30 points
Interpretation of data	30 points
Quality of graphics slides	20 points
Speaker delivery	20 points

Field Trips:

Field trips will be from 8:00 to 5:00 on Saturday April 13 and May 4. Students please prepare for variable and

inclement weather and bring the following:

- knee or hip boots or higher for walking in water or through wetted areas
- rain coat
- warm clothing (bring layers as it could be warm or cold this time of year)
- hat and/or sunscreen
- notebook
- small backpack
- lunch
- camera (optional)
- field trip insurance (optional but recommended see below)

School of Aquatic and Fishery Sciences Course Policies:

Academic Integrity:
Plagiarism, cheating, and other misconduct are serious violations of your contract as a student. We expect that you will know and follow the University's policies on cheating and plagiarism. Any suspected cases of academic misconduct will be handled according to University regulations. More information, including definitions and examples of Academic Misconduct, can be found at: **http://depts.washington.edu/grading/conduct/index.html (http://depts.washington.edu/grading/conduct/index.html)**

Disability Accommodations:
To request academic accommodations due to a disability, please contact Disability Resources for Students (DRS), 011 Mary Gates Hall, Disabled Student Services, 448 Schmitz, (206) 543-8924, (TTY) 543-8925 or uwdrs@uw.edu. **http://depts.washington.edu/uwdrs/ (http://depts.washington.edu/uwdrs/)** . If you have a letter from Disabled Student Services indicating that you have a disability that requires academic accommodations, please present the letter to the instructor so we can discuss the accommodations needed for this class.

Course Summary:

Date	Details	
Mon Apr 1, 2019	**Introduction to restoration (https://canvas.uw.edu/calendar?event_id=1238326&include_contexts=course_1273354)**	12:30pm to 2:20pm
Wed Apr 3, 2019	**Salmon life history (https://canvas.uw.edu/calendar?event_id=1238327&include_contexts=course_1273354)**	12:30pm to 2:20pm

Date	Details	
Mon Apr 8, 2019	LAB - Limiting factors (https://canvas.uw.edu/calendar?event_id=1238323&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed Apr 10, 2019	Watershed and reach scale processes (https://canvas.uw.edu/calendar?event_id=1238308&include_contexts=course_1273354)	12:30pm to 2:20pm
Sat Apr 13, 2019	Stillaguamish and Sauk field trip (https://canvas.uw.edu/calendar?event_id=1238312&include_contexts=course_1273354)	8am to 5pm
Mon Apr 15, 2019	LAB - Assessments, sediment (https://canvas.uw.edu/calendar?event_id=1238315&include_contexts=course_1273354)	12:30pm to 2:20pm
	Assignment 1 (https://canvas.uw.edu/courses/1273354/assignments/4689591)	due by 11:59pm
Wed Apr 17, 2019	LAB - Assessments, riparian (https://canvas.uw.edu/calendar?event_id=1238318&include_contexts=course_1273354)	12:30pm to 2:20pm
Mon Apr 22, 2019	LAB - Synthesis and identification of restoration actions (https://canvas.uw.edu/calendar?event_id=1238321&include_contexts=course_1273354)	12:30pm to 2:20pm
	Assignment 2 (https://canvas.uw.edu/courses/1273354/assignments/4689592)	due by 11:59pm
Wed Apr 24, 2019	LAB - Restoration techiques (https://canvas.uw.edu/calendar?event_id=1238324&include_contexts=course_1273354)	12:30pm to 2:20pm
Mon Apr 29, 2019	Prioritizing restoration projects (https://canvas.uw.edu/calendar?event_id=1238309&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed May 1, 2019	Lacustrine restoration (https://canvas.uw.edu/calendar?event_id=1238313&include_contexts=course_1273354)	12:30pm to 2:20pm
	Assignment 3 (https://canvas.uw.edu/courses/1273354/assignments/4689593)	due by 11:59pm
Sat May 4, 2019	Floodplain and estuarine restoration field trip (https://canvas.uw.edu/calendar?event_id=1238316&include_contexts=course_1273354)	8am to 5pm
Mon May 6, 2019	Proposals (https://canvas.uw.edu/calendar?event_id=1238694&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed May 8, 2019	Riparian restoration (https://canvas.uw.edu/calendar?event_id=1238322&include_contexts=course_1273354)	12:30pm to 2:20pm

Date	Details	
	Assignment 4 (https://canvas.uw.edu/courses/1273354/assignments/4689594)	due by 11:59pm
Mon May 13, 2019	Stakeholder involvement (https://canvas.uw.edu/calendar?event_id=1238325&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed May 15, 2019	LAB - Monitoring restoration (https://canvas.uw.edu/calendar?event_id=1238307&include_contexts=course_1273354)	12:30pm to 2:20pm
	Assignment 5 (https://canvas.uw.edu/courses/1273354/assignments/4689595)	due by 11:59pm
Mon May 20, 2019	LAB - Monitoring parameters and sample size (https://canvas.uw.edu/calendar?event_id=1238310&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed May 22, 2019	Nearshore ansd estuarine monitoring (https://canvas.uw.edu/calendar?event_id=1238314&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed May 29, 2019	Effective scientific presentations (https://canvas.uw.edu/calendar?event_id=1238311&include_contexts=course_1273354)	12:30pm to 2:20pm
	Assignment 6 (https://canvas.uw.edu/courses/1273354/assignments/4689596)	due by 11:59pm
Mon Jun 3, 2019	Oral presentation practice (https://canvas.uw.edu/calendar?event_id=1238317&include_contexts=course_1273354)	12:30pm to 2:20pm
Wed Jun 5, 2019	Assignment 7 (https://canvas.uw.edu/courses/1273354/assignments/4692405)	due by 11:59am
	Oral presentations (https://canvas.uw.edu/calendar?event_id=1238320&include_contexts=course_1273354)	12:30pm to 2:20pm
	Roll Call Attendance (https://canvas.uw.edu/courses/1273354/assignments/4689597)	