

*DRAFT SYLLABUS - subject to change*

**Klamath River Basin Field Course:  
Watershed Restoration, Ecology, and Natural History  
(ESM 469) 3 units**

**Saturday, July 6 – Friday, July 19 (14 days total)**

**On-campus meetings:**

We will meet three times during the spring semester to discuss logistics and initial course content. Meeting times will be determined based on students' availability.

<b>Instructor:</b>	Dr. Alison O'Dowd
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**Contact Hours:**

Instructors will be in close contact with students throughout the program, with the Instructors on-site and available. Class will meet every day during the course, with the Instructors available for individual meetings upon request.

**Class Meetings:**

This course involves 14 days of instruction, field activities, and student independent work. The class will meet every day of this course (14 days straight), with limited time during the program for resupplying or doing laundry. Faculty and staff work directly with students 8-10+ hours a day and are available for tutorials and coursework discussion before and after scheduled activities. Activities typically begin each morning and extend into the late afternoon, with some breaks for meals, rest, and independent work and study time. Most evenings include scheduled activities, such as guest lectures, study time, and article discussion. Some activities may start as early as 6 am or end as late as 10 pm. The first two days of the course (July 6 & 7) take place on the Cal Poly Humboldt campus in Arcata, CA. The following 12 days (July 8-19) will take place at various sites throughout the Klamath Basin.

**Course Credit:**

Students receive credit for one undergraduate course:

**ESM 469.** *Field Course in Environmental Science and Management (3).* Gain hands-on, outdoor experience through field activities and tours. Topics and locations vary. Students will pay for course fee and tuition through the College of Extended Education and Global Engagement.

This course has distinct objectives that focus on watershed ecology, restoration and past and current events that apply to issues surrounding these topics. Students that successfully complete this course will receive 3 units of ESM 469 from Cal Poly Humboldt. This course can serve as a substitution for several courses on campus including, but not limited to, ESM 355 (Principles of Ecological Restoration), BIOL 306 (California Natural History) or an upper division elective. Students should consult with their Academic Advisor to see how this course can count as a requirement for their major, minor or degree.

### **Course description:**

This course is an interdisciplinary synthesis of topics concerning restoration, ecology and natural history within the Klamath River Basin. Throughout the course, students will investigate topics associated with past, current and future Klamath Basin restoration projects and associated ecology and natural history. Teaching and learning will be facilitated through lectures, discussions, group activities, service projects and fieldwork.

There are three main themes that we will be using to explore topics of restoration throughout this course: 1) Ecology/Natural History, 2) Cultural Environmental History, and 3) Field Survey Methods (such as monitoring of water quality, amphibians, fish, benthic macroinvertebrates and plants).

The Klamath River flows 253 miles from southern Oregon to the California coast, draining a basin of more than 15,000 square miles. The Klamath River was once the third most productive salmon and steelhead river in the West, surpassed only by the Columbia and the Sacramento Rivers. With a long history of impact and over-allocated resources, the Klamath Basin faces numerous water quality and quantity challenges. Since the 1860s, the watershed and its fisheries have been a topic of focus, with negotiations intensifying in recent history. Because of these issues, more focus and interest are directed towards the restoration of this region's ecological and natural resources. The Klamath River Basin is an ideal location to study restoration, ecology, and natural history because of the expansive diversity in habitat types, hydrology, geology, ecology, land ownership, and land use. There are numerous restoration projects that previously, currently and are planned to occur within the Klamath Basin that incorporate all of these themes in one way or another. One restoration project of particular focus in this course will be the removal of four large dams on the mainstem Klamath River, which is scheduled to begin in 2023 and will be the largest dam removal project in history.

We will explore the California portion of the Klamath Basin through field visits, hiking, rafting, snorkeling and driving. We will visit Iron Gate Dam and reservoir, high alpine lakes, deep clear pools of the Salmon River via snorkel and mask, and observe the banks of the Klamath River as we raft down the mid-Klamath section. Throughout our exploration of the Basin, we will learn about principles of restoration, ecology, and natural history as we meet with representatives from local nonprofits, government agencies, and Native Tribes.

### **Course Learning Outcomes**

Following this program, students should have working knowledge of and experience in:

1. The variety of restoration projects in the Klamath Basin and how and why they are implemented.
2. The components of the rich and diverse ecosystems that comprise the Klamath River Basin, both terrestrial and aquatic.
3. Field observation skills, including methods for documenting and sharing findings, primarily focused on restoration monitoring and natural history observations.
4. Critical reading, discussion and evaluation of primary literature in ecology and restoration.
5. Exploration of the unique natural history and geology of the Klamath Basin.
6. The significance and history of Native Tribes in the Klamath Basin
7. The array of employment opportunities related to watershed restoration and natural resource science
8. Basic camping skills, including safety, field navigation, meal preparation, and group management.
9. Basic ecological, management and conservation concepts as related to the Klamath River Basin.

## Prerequisites

No prerequisite is required, but successful completion of an introductory Environmental Science/Studies, Geography, Biology, Botany, Ecology, Recreation or related course is highly recommended.

## Required Readings

Materials from various texts will be made available online via the course Canvas site and in a course reader. Scientific articles and other literature will be assigned prior to and during the course. Additional handouts provided throughout the course will be assigned in order to complement these readings.

Examples of additional readings:

- Bartholow, J.M., Campbell, S.G. and Flug, M., 2004. Predicting the thermal effects of dam removal on the Klamath River. *Environmental Management*, 34(6), pp.856-874.
- Garwood, J. and M. Kauffmann. 2022. The Klamath Mountains: A Natural History. Backcountry Press.
- Gosnell, H. and Kelly, E.C., 2010. Peace on the river? Social-ecological restoration and large dam removal in the Klamath basin, USA. *Water Alternatives*, 3(2), p.362.
- Hodge, B.W., Wilzbach, M.A., Duffy, W.G., Quiñones, R.M. and Hobbs, J.A., 2016. Life history diversity in Klamath River steelhead. *Transactions of the American Fisheries Society*, 145(2), pp.227-238.
- Kauffmann, M. 2012. Conifer Country: A natural history and hiking guide to the 35 conifers of the Klamath Mountain region. Backcountry Press, Kneeland, CA.
- National Research Council, 2008. Hydrology, ecology, and fishes of the Klamath River basin. National Academies Press.
- Pollock, M., Witmore, S. and Yokel, E., 2019. A field experiment to assess passage of juvenile salmonids across beaver dams during low flow conditions in a tributary to the Klamath River, California, USA. *bioRxiv*, p.856252.
- Powers, K., Baldwin, P., Buck, E.H. and Cody, B.A., 2005. Klamath River basin issues and activities: an overview. Congressional Research Service, the Library of Congress.
- Schakau, V., Hilker, F.M. and Lewis, M.A., 2019. Fish disease dynamics in changing rivers: Salmonid Ceratomyxosis in the Klamath River. *Ecological Complexity*, 40, p.100776.
- Wallace, D. R. 2003. The Klamath Knot: Explorations of Myth and Evolution, Twentieth Anniversary Edition. University of California Press. 174 pp.
- Most, S. 2006. River of renewal: myth and history in the Klamath Basin. Portland: Oregon Historical Society Press in association with University of Washington Press, Seattle & London.

## Identification Apps

As naturalists there are many Apps available for your phone that help identify plants and animals in the field. We recommend downloading the following apps to your phone prior to the start of the course:

- Merlin Bird ID by Cornell Lab:  
<https://apps.apple.com/us/app/merlin-bird-id-by-cornell-lab/id773457673>
- iNaturalist: <https://www.inaturalist.org/>
- Seek [https://www.inaturalist.org/pages/seek\\_app](https://www.inaturalist.org/pages/seek_app)

## Assignments & Grading

Grading Scale: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F <60% (+ and – grades will be given).

Assignment	% of grade
Taxonomic Species Assignment	10%
Taxonomic Species Presentation	10%
Research and Lead Article Presentation & Discussion	20%
Restoration Article Participation	10%
Final Exam	25%
Appreciation Letter	5%
Participation/Attendance	20%
Total	100%

## Course Requirements

### Taxonomic Species Assignment (10%)

For this assignment, you will provide a description of your 2 assigned species (1 animal and 1 plant). For each species, you will need to research its Taxonomy, Geographic Range, Field Characteristics, Ecology, Cultural Significance, and Protection Status. There are plenty of journal articles, textbooks, and websites out there to help you research your species, but do not just copy and paste information. The best strategy is to thoroughly research the information and compile it into a more cohesive report.

### Species to choose from (Pick 1 animal or bird and 1 tree or forb):

#### Animals

1. Chinook Salmon (*Oncorhynchus tshawytscha*), Coho Salmon (*Oncorhynchus kisutch*) and steelhead trout (*Oncorhynchus mykiss*)
2. Mountain Lion (*Puma concolor*)
3. Beaver (*Castor canadensis*)
4. Black Bear (*Ursus americanus*)
5. Cascades Frog (*Rana cascadae*)
6. Roosevelt Elk (*Cervus canadensis roosevelti*)
7. North American River Otter (*Lontra canadensis*)
8. Western Pond Turtle (*Actinemys marmorata*)
9. Salmonfly (*Pteronarcys Californica*)

#### Birds

1. Osprey (*Pandion haliaetus*)
2. Bald eagle (*Haliaeetus leucocephalus*)
3. Belted kingfisher (*Megaceryle alcyon*)
4. Common Raven (*Corvus corax*)
5. American dipper (*Cinclus mexicanus*)
6. Turkey vulture (*Cathartes aura*)
7. Northern spotted owl (*Strix occidentalis caurina*)

## **Trees**

1. Ponderosa pine (*Pinus ponderosa*)
2. Pacific madrone (*Arbutus menziesii*)
3. Douglas fir (*Pseudotsuga menziesii*)
4. Western redcedar (*Thuja plicata*)
5. Coast redwood (*Sequoia sempervirens*)
6. Ghost pine (*Pinus sabiniana*)
7. Oregon white oak (*Quercus garryana*)
8. Western juniper (*Juniperus occidentalis*)
9. Northern foxtail pine (*Pinus balfouriana* ssp. *balfouriana*)

## **Forbs**

1. California fuchsia (*Epilobium canum*)
2. Wavy-leafed soap plant (*Chlorogalum pomeridianum*)
3. Oregon sunshine (*Eriophyllum lanatum*)
4. Oregon grape (*Berberis aquifolium* and *nervosa*)
5. Cobra lily (*Darlingtonia californica*)
6. Spreading phlox (*Phlox diffusa*)
7. Pinedrops (*Pterospora andromedea*)

## **Taxonomic Species Presentation (10%)**

For this assignment, you will give a 10-minute presentation to the rest of the class on your two assigned species (one plant, one animal). These presentations will take place during the first 2 days of the course while we are in the classroom on Cal Poly Humboldt campus. In addition to the presentation, you will also be considered the class “expert” on your two species, being able to identify them in the field successfully (if we see them) and then you will be responsible for teaching everyone else in the class not only what species it is but how to identify it.

## **Article Presentation & Discussion (20%)**

In pairs of two, students will choose a single publication from a selection of scientific research papers in the field of restoration in the course reader. Students will read, take notes, and summarize the research in a written worksheet provided by instructors. Then, during the course, students will present a brief oral synopsis (10-15 mins) of the research that will address questions such as: what needs does the research fill?; how was the research performed?; and what were the pertinent outcomes? Following the synopsis, the pair will lead a discussion with the class on the specific article and more generally on the major ecological topics involved (from additional research performed on the topic). Although each presentation will focus on a single article, students will draw from scientific articles, popular media, field guides and personal experience during presentations. Grades will be based on how effectively the group covers the main topics of the articles, adequately answers questions, and stays within the specified time period.

## **Topics (1 article per topic in course reader):**

1. Northern Spotted Owl demography and barred owl removal
2. TEK in the Klamath Basin (Yurok, Karuk, Hoopa Tribes) - related to NR mgt and restoration
3. Trinity Dams and Trinity River Restoration Program
4. Amphibian populations and restoration in Klamath Mountains
5. Beaver Dam Analogs (BDAs)

6. Klamath Dams and Dam removal
7. Salmon and river ecology
8. Fire ecology on the Klamath landscape

### **Article Participation (10%)**

All students are required to read the scientific restoration articles that we will discuss as a group. This includes those articles other classmates will be presenting on, as well as other articles assigned by the instructors. Students will be graded on their involvement in discussions by demonstrating their ability to summarize the major points, ask thoughtful questions, and share their own opinions. When not in an open discussion, students are required to actively listen to the presentations and prepare relevant questions. Grades will be based on whether students have read the required articles and their participation in discussions and presentations. It is also important that students demonstrate an open mind and a respectful etiquette in interacting with other students and community groups.

### **Final Exam (25%)**

We will be learning a lot about the Klamath Basin as we explore and travel through it. Students will need to take good notes during the course in preparation for a final exam on that material at the end of the course. The final exam will be written by the instructors during the field course and will post the Final Exam to Canvas by Monday, June 26th (the Monday after the last day of the field course). Students will have 2 hours to complete the exam once they open it. The exam is open book/open note and will consist of questions directly from material covered during the field course. Question formats will be a mixture of short answer, multiple choice, fill in the blank, and essay questions. The final exam will be due by Friday, June 30th.

### **Appreciation Letter (5%)**

Each student will be required to write an email (or handwritten letter) to a guest speaker, researcher, conservationist or guide that interacts with our group throughout the course. The Appreciation Letter is to show gratitude to the individual who shared their skills and knowledge with us and to explain to them how their involvement was inspiring or made an impact. These letters should be no more than one to two paragraphs and will either be drafted by hand or electronically and sent or given to the Instructor for grading before they are sent to the appropriate person. This assignment is an exercise to help students understand the importance of communication and networking with individuals in their discipline.

### **Participation & Attendance (20%)**

This segment of the course is probably the most important. Participants are expected to attend all class sessions for all course functions including group activities, field study trips, service-learning activities, guest presentations, etc. Unexcused absences will result in the final grade being lowered accordingly. Your participation grade includes being on-time to all course activities, maintaining a positive attitude throughout, actively engaging in all activities, and being attentive and respectful to all speakers (including fellow students). Behavior such as talking while a speaker is talking, being on a cell phone during inappropriate times, repeated tardiness and not staying with the group will impact this portion of your grade.

### **Campus Policies and Resources**

Visit the **Syllabus Addendum** website

(<http://www2.humboldt.edu/academicprograms/syllabus-addendum-campus-resources-policies>) for information about campus policies, procedures and resources for students. The site includes links such as the academic honesty policies, attendance and disruptive behavior policy, student code of conduct,

resources for students with disabilities, and campus procedures (such as adding and dropping a class). Students are responsible for knowing the policies and procedures related to the above topics. Please take the time to read the information on this website.

**Academic Dishonesty and Plagiarism:** Any exam, quiz, or assignment submitted by you and that bears your name is presumed to be your own original work that has not previously been submitted for credit in another course unless you obtain prior written approval to do so from your instructor. Cheating and plagiarism are very serious matters and will be treated as such.

*Classroom conduct and disruptive behavior:* Disruptive behavior during class time will not be tolerated. Do not come to class under the influence of drugs or alcohol. Students are responsible for knowing the policy regarding attendance and disruptive behavior, posted at the following website:  
<https://www2.humboldt.edu/studentrights/attendance-behavior>

#### *Drugs and alcohol*

This intensive field course is intended to foster a supportive and inclusive learning environment. The use of drugs (including cannabis) or alcohol are not permitted at any time during the field course. Students who do not follow this policy will be at risk of immediate dismissal from the course.

7	Fri, July 15	<p>Drive from Etna to Yreka to do laundry and resupply (food and gas).  <b>1 pm:</b> Tour of <b>Iron Gate Hatchery</b> Hike to spring (swimming hole) on Horseshoe Creek.</p> <p><b>EVENING DISCUSSION #4: KLAMATH DAM AND DAM REMOVAL</b></p>	<p>Field activity location:  Yreka and Iron Gate reservoir  Camping: <a href="#">Camp Creek Campground</a>  along Iron Gate reservoir or Copco Cove or Tree of Heaven.</p>
8	Sat, July 16	<p><b>10 am: Visit Iron Gate Dam</b> and meet with <b>Klamath River Renewal Corp (KRRC)</b> personnel to discuss dam removal plans and restoration implications. (hard hats and safety vests).  Visit - Bogus Ck, Beaver Creek and Grider Creek - collect Alison's Hobo temp gages</p> <p><b>EVENING DISCUSSION #5: OFF-CHANNEL POND RESTORATION</b></p>	<p>Field activity location:  Iron Gate Dam</p> <p>Camping: <a href="#">Sarah Totten Campground</a>  (group site #12)</p>
9	Sun, July 17	<p><b>Tour of off-channel pond restoration project at Horse Creek</b>  <b>9 am:</b> Toz Soto (Karuk Tribe) will meet us at Sarah Totten Campground</p> <p>7 pm: Evening discussion w/ Regina Chichizola (Save CA Salmon) and Ken (Karuk Tribe)</p>	<p>Field activity location:  Horse Creek  Camping: <a href="#">Curly Jack campground</a></p>
10	Mon, July 18	<p><b>Full-day rafting trip of mid-Klamath River</b> (put-in at Curly Jack)  <b>9 am:</b> meet at boat launch at Curly Jack. Outfitter: <a href="https://www.awrafting.com/">https://www.awrafting.com/</a>  Discuss river processes, geomorphology, ecology, natural history and implications of dam removal as we raft down the river. Day hike to Ukonom Falls.</p> <p><b>EVENING DISCUSSION #6: SALMON CONSERVATION AND RESTORATION</b></p>	<p>Field activity location:  Mid-Klamath River</p> <p>Camping: <a href="#">Curly Jack campground</a></p>
11	Tues, July 19	<p><b>Salmon River snorkeling and restoration activity</b>  <b>10:30 am</b> - meet Sophie Price (Salmon River Restoration Council) at Wooley Creek</p> <p>Learn about fish identification and long-term salmonid monitoring.  Fish passage improvement activity and snorkeling on Wooley Creek.</p>	<p>Field activity location: Salmon River</p> <p>Camping:  <a href="#">Oak Bottom campground</a></p>
12	Wed, July 20	<p><b>Cultural burning</b> with the Karuk Tribe and Mid-Klamath Watershed Council (MKWC)  Visit a previously burned site and discuss prescribed burns and fuel reduction projects.</p> <p><b>9 am:</b> Luna Latimer (Mid Klamath Watershed Council) and Frank Lake, Research Ecologist (US Forest Service) will meet us at Oak Bottom Campground</p>	<p>Field activity location:  Prescribed fire locations near Orleans</p> <p>Camping:  <a href="#">Oak Bottom campground</a></p>
13	Thurs, July 21	<p>Drive from Oak Bottom over Bald Hills road to Klamath mouth.  <b>Visit mouth of Klamath and discuss estuary and river mouth habitats</b></p> <p><b>EVENING DISCUSSION: Keith's podcast transcript (led by Mason &amp; Alison)</b></p>	<p>Field activity location:  Bald Hills to mouth of Klamath  Camping: <a href="#">Kamp Klamath:</a>  WATER and showers</p>
14	Friday, July 22	<p><b>Lower Klamath tributaries</b>  <b>10 am:</b> meet at the Requa boat ramp off Requa Road  Boat ride up Klamath River to Blue Creek. Discuss estuary and river mouth habitats and importance of tributaries.  Course Wrap-up. Drive from Klamath to Arcata</p>	<p>Field activity location:  Lower Klamath River and Blue Creek</p>