

Department of Environmental Sciences
College of the Environment
Western Washington University

ESCI 409 RIPARIAN CONSERVATION

Instructor: John McLaughlin
4 Credits

Course Description

This course will immerse you in the science and practice of conservation applied to rivers and adjacent lands. Rivers are universal landscape structures that underlie cultural identity, provide essential ecosystem services, support substantial biodiversity, and are among the region's most threatened ecosystem components. Riparian zones are essential to more than half of species globally, and more than 75% of terrestrial animals in the western U.S. Anthropocene pressures disproportionately impact riparian systems in diverse and synergistic ways. These pressures include floodplain development, changing climates, riparian vegetation removal, bank hardening, woody debris removal, hydropower development and operation, increasing water appropriation to meet growing human demands, introduction of non-native organisms and pathogens, and discharge of nutrients and other pollutants. In contrast, evolving strategies for restoring human-river relationships offer disproportionate conservation benefits.

Conservation integrates diverse knowledges to address an applied mission. Accordingly, the course will emphasize conservation applications and it will integrate science with concepts, perspectives, and approaches beyond narrowly defined environmental science. Class meetings, field expeditions, and projects will engage you in solving riparian conservation problems. You will design conservation solutions and research on an individual basis and in collaboration with small peer groups. Solution and research design development will be facilitated through extensive instructor-student feedback. The course will approach conservation challenges and opportunities experientially, by exploring field sites via day hikes, backpacking, and a river expedition. You will develop competence in group collaboration and responsible use of riparian environments through instruction and experience in expedition behavior and Leave No Trace practices.

Learning Outcomes

- (1) Demonstrated ability to critically analyze and evaluate approaches to riparian conservation issues.
- (2) Demonstrated ability to design solutions to riparian conservation problems.
- (3) Competence in integrating multiple perspectives and kinds of information.
- (4) Conceptual and experiential understanding of regulations and behaviors intended to limit recreational impacts on rivers and riparian environments.
- (5) Conceptual and practical understanding of individual and group behavioral norms to maintain safety, camp and travel efficiency, and minimize social and environmental impacts.
- (6) Ability to write effectively about conservation designs.
- (7) Ability to present ideas effectively using visual and narrative modalities.

Prerequisite: Admission to ESCI Field Camp.

Grading

Individual design plan (10%), individual design report (20%), group design plan (10%), group research draft report (10%), group research report (20%), group research presentation (10%), conservation essay (10%), expedition behavior (10%)

ESCI 409 Riparian Conservation

Readings

- Collins BD, Montgomery DR, Fetherston, KL, and Abbe TB. 2012. The floodplain large-wood cycle hypothesis: A mechanism for the physical and biotic structuring of temperate forested alluvial valleys in the North Pacific coastal ecoregion. *Geomorphology* 139–140:460–470.
- Ford E. 2018. The greater unconformity. *Summit to Salish Sea: Inquiries and Essays* 3(1):3. [online] <https://cedar.wvu.edu/s2ss/vol3/iss1/3/>
- Fox CA, Reo NJ, Turner DA, Cook J, Dituri F, Fessell B, Jenkins J, Johnson A, Rakena TM, Riley C, Turner A, Williams J, Wilson M. 2017. The river is us; the river is in our veins: redefining river restoration in three Indigenous communities. *Sustainability Science* 12:521-533.
- Krosby M, Theobald DM, Norheim R,McRae BH. 2018. Identifying riparian climate corridors to inform climate adaptation planning. *PLoS ONE* 13(11):e0205156 [online] <https://doi.org/10.1371/journal.pone.0205156>
- Lackey, Robert T. 2017. Science and salmon recovery. pp.69-94. In: Science and Problem Solving Under Post-Normal Conditions: From Complex Problems to New Problem Solving Strategies, Edward P. Weber, Denise H. Lach, and Brent S. Steel, editors, Oregon State Univ. Press, Corvallis, OR. [online] https://www.researchgate.net/publication/313117372_Science_and_Salmon_Recovery
- McCaffery, R., J. McLaughlin, K. Sager-Fradkin, and K. J. Jenkins. 2018. Terrestrial fauna are agents and endpoints in ecosystem restoration following dam removal. *Ecological Restoration* 36:97-107.
- McLaughlin JF. 2013. Engaging birds in vegetation restoration after Elwha dam removal. *Ecological Restoration* 31:46-56.
- Naiman, R.J., Bilby, R.E. and Bisson, P.A., 2000. Riparian Ecology and Management in the PacificCoastal Rain Forest. *BioScience* 50:996-1011.
- Northwest Indian Fisheries Commission (NWIFC). 2018. *gʷədʷadad*: Tribal Habitat Strategy. NWIFC, Olympia, WA. [online] <https://nwtreatytribes.org/habitatstrategy/>
- O'Connor JE, JJ Duda, GE Grant. 2015. 1000 dams down and counting. *Science* 348:496-497.
- Prach K, Chenoweth J, and R. del Moral. 2019. Spontaneous and assisted restoration of vegetation on the bottom of a former water reservoir, the Elwha River, Olympic National Park, WA, U.S.A. *Restoration Ecology* 27:592-599.
- Stoffels, R.J., Bond, N.R. and Nicol, S., 2018. Science to support the management of riverine flows. *Freshwater Biology* 63:996–1010.
- Vorosmarty, C. J., McIntyre, P. B., Gessner, M. O., Dudgeon, D., Prusevich, A., Green, P., Glidden, S., Bunn, S. E., Sullivan, C. A., Liermann, C. R. and Davies, P. M., 2010. Global threats to human water security and river biodiversity. *Nature* 467:555–561.

Policies and Resources

WWU Course Policies: We will observe all university policies regarding academic honesty, disability accommodation, religious accommodation, and equal opportunity. Please review those policies at the following site. <https://syllabi.wvu.edu/>

In particular, reasonable accommodation for students with documented disabilities should be established within the first week of class and arranged through the Disability Access Center: <https://disability.wvu.edu/>

Students seeking religious accommodation should provide written notice to the instructor within the first two weeks of the course.

WWU provides resources for additional student needs. Students with medical needs may find help at the Student Health Center: <https://studenthealth.wvu.edu/>

Students with emotional or psychological concerns may find help at Counseling Center: <https://counseling.wvu.edu/>

The Office of Student Life can help with difficult personal or family issues and in navigating the university bureaucracy: <https://wp.wvu.edu/officeofstudentlife/>

Students with challenging personal circumstances are encouraged to contact the instructor before those issues impact work in the course, or as soon as possible. I will not consider this as weakness or requests for special favors. We will have better opportunities to develop strategies to help you succeed if we begin early.

ESCI 409 Riparian Conservation

Schedule

<u>Week</u>	<u>Topics</u>	<u>Assignments</u>
1	Orientation, forms, & norms Biodiversity associated with rivers and riparian areas Ecological functions and services of rivers Regional safe operating space; implications for riparian conservation Environmental flows Indigenous relationships: with rivers, river conservation, and river restoration Riparian Conservation design process Riparian Conservation design project field trip Conservation research project introductions Hydro development impacts on riparian systems Dam removal and restoration Elwha ecosystem restoration design Wildlife roles in riparian restoration Gear Review Ropes and knots	Literature search: list of references Literature review Conservation design draft report
2	Salmon conservation Riparian restoration Large woody debris -- roles and functions -- restoration applications Climate change impacts on rivers Climate mitigation strategies for river conservation Wild & Scenic Rivers -- protections and regulations -- History -- WSR extent and distribution -- Prospects Elwha trip preparation Cook group organization, Elwha trip Elwha trip safety & environmental briefing	Literature review revision Conservation design revision Conservation research proposal Abstract draft
3-4	Recreation impacts, management, LNT principles/practices Camp LNT gear and protocol Elwha restoration assessment project Riparian conservation design in the field Wildlife roles in riparian restoration in the field Conservation research project development	Research proposal revision Abstract, revision Cons. res. project development

ESCI 409 Riparian Conservation

Schedule, continued

<u>Week</u>	<u>Topics</u>	<u>Assignments</u>
5	Salish Sea Ecosystem Conference -- riparian conservation presentations River safety and rescue training River trip safety & environmental briefing Cook group organization, river trip	Research proposal, final
6-7	Wild & Scenic Rivers, revisited in the field River camp LNT gear and protocol Research project implementation Riverbird distribution project Riparian vegetation browse project Conservation prospects discussion	Research project data collection
8	Conservation research project data analysis WWU Scholars Week poster presentation	Research poster creation Research poster presentation
9	Research paper writing and editing	Conservation essay Research paper draft & revisions
10	Research paper writing and editing	Research paper, final version