

ESM 485 (11148)/585(11157) Ecology & Management of Bio-Invasions
 Tuesdays & Thursdays noon-1:50 in Cramer Hall rm 328 (plus asynchronous content on Canvas)

Instructor: Cat de Rivera, derivera@pdx.edu

Drop-in hours: in SRTC 238e Tuesdays 2-3:00, Thursdays 11-11:45 and Fridays 11:15-12, or by appointment. LMK if you'd rather zoom.

Course Overview: Welcome to Bio-invasions! E.O. Wilson (1997) wrote, “Extinction by habitat destruction is like death in an automobile accident: easy to see and assess. Extinction by the invasion of exotic species is like death by disease: gradual, insidious, requiring scientific methods to diagnose.” This course provides an overview of ecology and management of introduced (non-native) species. Introduced problematic species (invasive species) can restructure ecosystems, affect the evolutionary trajectory of native species (including extinction), or impact culturally important species, local industries, or human health. They are ranked as the second greatest threat to natural areas and rare native species. Through lectures, readings, projects, and discussions, students will examine the extent and consequences of species introductions as well as causes and management options. Ecological fundamentals provide foundational understanding for you to create management products. The course briefly addresses relevant economics, ethics, policy, and management practices.

Objectives - By the end of the course students will be able to interpret and synthesize information about non-native species to **create** a useful **management product**. Students will **build skills** of **reading** pertinent **primary literature** and **science communication**. All students will increase their professional network and networking skills relevant to management of biological invasions. Graduate students will also demonstrate leadership such as project management skills or lend expertise to our current understanding of invasive species ecology, evolution, economics, or management.

Schedule & Assignments

| Wk | Date | Before class (see canvas for more details) | In class Topic/Activity |
|----|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 | 9/26, 9/28 | Review syllabus, By Thurs: Read project options and select top project choice(s). Skim Ch 1-4; Lecture on overview & steps Transport, Intro, Establishment. Skim handouts and answer questions on: how tell/who involved; optional Silent Invasion video. | Tue: Introduction to class, projects, and invasions; Field trip; Thu: interact with project partners! Assign reading structure |
| 2 | 10/3, 10/5 | By Tue: Pick project and: start project methods; Read 2 Papers (see Readings 1-6), By Thu: read Tens Rule. Skim Ch 10 perception, currencies & ch 7; 585: ID in-class activity | Tue lecture Steps (spread, impact) & Econ/ag... impacts; Discuss papers; time for teams Thu, discuss 10s Rule; Project Management: work on methods & production schedule to turn in at end of class. lecture: finish above |
| 3 | 10/10, 10/12 | Ch 9, paper 5 (Graham et 2018) & 6 (Grenz), lectures: Impacts to ecosystems & spp; read example risk assessment; | Tue: Discuss readings, invasion debt, balance of invasive effects; Projects: Finish project methods by COB 10/12 |
| 4 | 10/17, 10/19 | Tue: submit proposed project management and methods to community partner/mentor (10/17); Ch 10 & pages 303-6 (on Risk Assessment); lecture: Impacts to spp; select project); paper 7 (Shurin et 2020). | Discuss reading, impacts; Intro to Risk Assessment; mgmt. projects; perspectives about invasions |
| 5 | 10/24, 10/26 | Ch 5; lecture: invadable communities; read up on opossum for Risk Assessment; mgmt. projects | Group risk assessment; management projects; lectures |
| 6 | 10/31- 11/2 | Ch 6; Lectures: Biotic Resistance; mgmt. projects; Thu: read Paper 8 (Yelenik et 2020) | Lecture and: Mgmt projects; Discuss paper 8 |
| 7 | 11/7, 11/9 | Ch 8, Lecture: pop dynamics of invaders; Paper 9 (Crowley et al. 2017); mgmt project; | Exam review; Discuss paper 9; mgmt projects |
| 8 | 11/14, 11/16 | Read Ch 13; Lecture: hw: peruse eradication playbook; Management; mgmt. projects; Read Ch 14; Lecture: Climate Change; mgmt. projects | Eradication playbook activity for emerald ash borer; mgmt projects |
| 9 | 11/21 | Exam; (1 st drafts due to Mentors 11/24) | Tues: Exam NO CLASS Thursday – Happy Thanksgiving |

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|------------|-----------------|-------------------------|---------------------------------------------------------------|
| 10 | 11/28, 11/30 | mgmt. projects | 11/30: Mgmt Project presentations |
| 11: Thu | 12/7 | Management products due | 10:15-12:05 Management project presentations cont'd |

Participation: Your participation is important to your learning and the learning of your peers. Please come prepared, ask questions, and contribute with your insights and expertise. If you have to miss class, you can make up the in-class assignment for the day by yourself later and submit to Canvas. Your participation in class is worth 1% of your total grade each week 10% total. I think everyone will get more out of the course if you can attend in person; however, I understand that any of us may have reasons, including needing to quarantine due to covid, that restrict our in-person attendance. Therefore, if you join remotely you will get full credit for participation. I have provided a zoom link for you (or maybe me too) <https://pdx.zoom.us/j/82260544179> . I benefit from tips and reminders throughout (even, ‘remember to record’) so I can help the course better meet your learning needs. If you miss class entirely, please be in touch with your project group.

Readings and Homework: Each student must read 6 articles for the class and each has a few corresponding questions that will help prepare you for discussion of the reading (I will only check that you have done these – not read them through carefully for quality). Homework also includes a few handouts to read and associated questions about the 10s rule and about policies.

the readings

Textbook: Lockwood JL, Hoopes MF, Marchetti MP. Invasion Ecology. Blackwell Publishing. (You can use the earlier version of this book if you must. PDFs of the first edition are available for free. But, it is not as good or up to date).

Required papers are listed below and are available via the PSU library system (and on Canvas). You’ll need an ODIN account to access library materials as well as Canvas. If you don’t have one, go to: <https://www.account.pdx.edu/>, call (503 725 4357), or email (help@pdx.edu) the office of information technologies help desk.

- You will read 2 articles, one from each set and be prepared to share what you learned. **Read One of**
 - Bhattacharyya, J. and Larson, B.M., 2014. The need for indigenous voices in discourse about introduced species: insights from a controversy over wild horses. *Environmental Values*, 23(6), pp.663-684.
 - Siegert, N.W., McCullough, D.G., Luther, T., Benedict, L., Crocker, S., Church, K. and Banks, J., 2023. Biological invasion threatens keystone species indelibly entwined with Indigenous cultures. *Frontiers in Ecology and the Environment*.

AND Read ONE of:

 - Clavero M, Garcia-Berthou E. 2005. Invasive species are a leading cause of animal extinctions. *Trends in Ecology and Evolution*, 20:110
 - Rejmánek M, Simberloff D. 2017. Origin matters. *Environmental Conservation* 44: 97–99,
 - Blackburn, T.M., Bellard, C. and Ricciardi, A., 2019. Alien versus native species as drivers of recent extinctions. *Frontiers in Ecology and the Environment*, 17(4), pp.203-207.
- Read your PART of: Graham NA, Wilson SK, Carr P, Hoey, AS, Jennings S, MacNeil MA. 2018. Seabirds enhance coral reef productivity and functioning in the absence of invasive rats. *Nature*, 559(7713), 250.
 - Also read pages 31-34. “A ceremony in the Weeds” of Grenz, J.B., 2020. *Healing the land by reclaiming an Indigenous ecology: a journey exploring the application of the Indigenous worldview to invasion biology and ecology* (Doctoral dissertation, University of British Columbia).
- Read your PART of: Shurin, J.B., Aranguren-Riaño, N., Duque Negro, D., Echeverri Lopez, D., Jones, N.T., Laverde-R, O., Neu, A. and Pedroza Ramos, A., 2020. Ecosystem effects of the world’s largest invasive animal. *Ecology*, 101(5), p.e02991.

4. Read your PART of: Yelenik, S.G., D’Antonio, C.M., Rehm, E.M. and Caldwell, I.R., 2020. Multiple feedbacks due to biotic interactions across trophic levels can lead to persistent novel conditions that hinder restoration. *Plant invasions: the role of biotic interactions*. CABI, pp.402-420.
5. Read ALL of Crowley SL, Hinchliffe S, McDonald RA. 2017. Conflict in invasive species management. *Frontiers in Ecology & the Environment* 15(3): 133–141, doi:10.1002/fee.147

Exam: The one exam will cover the lectures to date and will mostly ask about major concepts with open-ended questions, which you should be able to answer with real, concrete examples; however, it will also have several multiple-choice questions which will be more specific. You can opt out of the exam and instead do another assignment that showcases your ecological knowledge surrounding biological invasions such as a paper, poster, or podcast on some aspect of invasions ecology.

Graduate Leadership: 585 students only: This is an opportunity to demonstrate leadership or expertise. You can be creative, making a learning activity for everyone or show how to do something that students need to do in their projects, etc. Your activity should last 10-20 minutes. Work with me about what it is and how and when you deliver it. Or lecture on an invasions topic I didn’t fully cover. Also, you can opt not to do this and instead follow the 485 grading.

Management Project: See separate writeup on this. Conduct your project with your group, largely outside of class (you’ll get limited time in class), and be sure to check in with your professional project partner several times. You’ll create a group project management and methods document and then a group final product or two from your project, and give a brief (~15-20 min) group presentation on it to the class. Each student should work on the project for ~25 hrs outside of class through the term, including meetings and other planning. Your grade will be based on the overall project product(s) (see rubric) as well your individual contributions (see self and group evaluation form). The goal of the final presentation is for you to share the great work you’ve done with the class and the set of class partners. Then your product will get posted on the OISC website for use.

| Grading component | 485 | 585 |
|-------------------------------------------|-----|------------------------|
| Homework, & reading questions | 8 | 8 |
| In-class assignments & participation | 12 | 12 |
| Exam or alternate assignment | 25 | 20 |
| Project Management & Methods | 2 | 2 |
| Management project: product | 42 | 42 |
| Management project: presentation | 6 | 6 |
| Management project: self/group evaluation | 5 | 5 |
| Lead in-class activity | x | 5 (or 0; 25% for exam) |
| Total grade | 100 | 100 |

Instructor Inclusivity Statement: It is my intent that students from all backgrounds and perspectives be well served by this course, that students’ learning needs be addressed both in and out of class, and that the diversity that students bring to this class be realized as a resource and strength. I aim to present materials and activities that are respectful of, and celebrate diversity including of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, culture, and religion. I encourage and appreciate your suggestions to help me or the course better realize these ideals: If any aspects of instruction or course design result in barriers to your inclusion or learning or even don’t make you feel supported and appreciated, please notify me. Similarly, please let me know ways to improve the effectiveness of the course for you personally or for other students or student groups. In addition, let me know of any religious or other events that may conflict with any of our class meetings so we can make arrangements for you. My goal is to create a learning environment that is equitable, that actively includes and welcomes you, and that fosters mutual respect and full participation for all students.

Land Acknowledgement: I respectfully acknowledge the land where Portland State University is located is the unceded territory and ancestral lands of the Multnomah, Kathlamet, Clackamas, Tumwater, Watlala bands of the Chinook, the Tualatin Kalapuya and other Indigenous nations of the Columbia River. I pay my respects to their elders past and present and value the deep relationship they have with the land. Please take a moment to consider the many legacies and ongoing violence, displacement, migration, and settlement of this land where we gather for class. Please also use this course to consider ways to protect and honor the environment to respect the land and its people.

Policies

Late policy: Due dates throughout the term aim to help you progress through the coursework, but are not punitive. I understand that hurdles crop up and you may need to turn assignments in late. Everything must be turned in by noon on midnight Thurs Dec 7 to be graded.

Illness: If you feel unable to attend class, either due to illness, high anxiety, or other reasons, please stay home but email me and your project partners. If you have questions or concerns at any time, please do not hesitate to contact me.

Email: I will typically return emails within 48 hrs. *Please put 'ESM 485' or 'ESM 585' into the subject along with the topic of your email. E.g., 'ESM 485: question on Methods'*

Conduct: We are to realize the 'highest ethical standards of professional' and student behavior. Check out the Student Code of Conduct, to which you are bound: <https://www.pdx.edu/dean-student-life/psu-code-student-conduct-and-responsibility>

- Practice classroom courtesy and help create a positive learning environment for everyone:
 - Treat each other with respect (listen, don't interrupt, be humble)
 - Care about your own and each other's learning
 - No harassment or discrimination
 - Participate: join the class, ask questions, do your work.
- If you have not already done so, please go through the on-line training for creating a safe, respectful campus: <https://canvas.pdx.edu/enroll/MXKGBT>

Plagiarism: Plagiarism is a form of academic dishonesty. If a student is found to have used someone else's writing, ideas, or other work without crediting it, they will receive a zero on the assignment. Please consult the Purdue OWL regarding plagiarism and other writing issues: <https://owl.english.purdue.edu/owl/resource/589/01/>

DRC: If you are a student with a documented disability and are registered with the [Disability Resource Center](#), please contact me so that we can arrange whatever academic accommodations you need.

Title IX You may report any incident of discrimination or discriminatory harassment, including sexual harassment, to either the [Office of Equity and Compliance](#) or the [Office of the Dean of Student Life](#). Please be aware that as a faculty member, I have the responsibility to report any instances of sexual harassment, sexual violence and/or other forms of prohibited discrimination.

Resources & Services for students: <https://www.pdx.edu/liberal-arts-sciences/clas-student-success>; <https://www.pdx.edu/dos/student-resources> including:

Writing Center: for class assignments, resumes... <https://www.pdx.edu/writing-center/> Cramer rm 188; **Free Tutoring...**: <https://www.pdx.edu/tutoring/> PSU library rm 245;

Career Services: <https://www.pdx.edu/careers/what-can-i-do-degree-environmental-studiesenvironmental-sciences> and <https://www.pdx.edu/careers/>; (find an [internship](#), learn how to craft your resumé, learn how to interview...) and <https://www.pdx.edu/careers/what-can-i-do-degree-environmental-studies>;

Student support services, including Multicultural Centers: <https://www.pdx.edu/diversity/student-support-programs> (e.g., <https://www.pdx.edu/cultural-resource-centers/la-casa-latina-student-center>; **Queer Resource Center:** www.pdx.edu/queer; **Veterans** <https://www.pdx.edu/veterans-resource-center/>); **LSAMP** (Louise Stokes Alliance for Minority Participation in STEM) 103 Epler Hall <https://www.pdx.edu/alliance-minority-participation/>

Computing needs: The [library has laptops and google chromebooks for check out](#) for fall quarter, and will deliver the equipment to your home. Please remember to note that your request is for the fall quarter so you receive the appropriate loan period.

Software needs: PSU has made many software licenses available to the PSU community for use on personal machines to facilitate remote learning and research through the [virtual computer lab](#). PSU students, faculty, and staff can also access [Microsoft Office](#) suite on their personal machines.

ESM webpage: all sorts of info on what the department is doing...: <http://www.pdx.edu/esm/>

Library Research Tutorials: <http://guides.library.pdx.edu/home/howto> and <http://guides.library.pdx.edu/biology>

Counseling and other health: SHAC: <https://www.pdx.edu/health-counseling/>

Food assistance: <https://www.pdx.edu/basic-needs-hub/food-assistance>

Undergraduate research opportunities: <https://www.pdx.edu/research/undergraduate-research>