

**ESM 483/583, Marine Conservation Science and Management**  
**Professor Elise Granek** **Winter 2021**

**Instructor:** Elise Granek  
**Lecture:** T, Th: 2 -3:50 am; SRTC 201  
**Office and phone:** (for future reference: SRTC 118B; x4241)  
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**Email:** [graneke@pdx.edu](mailto:graneke@pdx.edu)  
**Web Site:** <http://d2l.pdx.edu/>

**Course Description**

This course provides an overview of marine conservation and management issues and the role of science therein. We will begin by discussing the state of the oceans and ecological differences between marine and terrestrial/aquatic systems. Next, we will discuss several major threats to ocean systems. Finally, we will focus on current issues in marine conservation and management and how these are being addressed through policies, management, and public action. Examples include hypoxia, ocean acidification, state of Oregon's kelp forests, current issues in shellfish fisheries **and** potential strategies and solutions in marine conservation and management including protected areas, regional and national policy and task force and planning efforts. Student teams will work on an agency-identified real-world project to produce a report and presentation to the agency partners.

**Objectives**

By the end of the course, students will understand the suite of issues affecting marine ecosystems and be able to communicate tools and strategies for addressing these issues, **create** an ecologically based, applicable **management document** on a marine conservation or management issue. Students will practice **skills of reading** pertinent **primary literature, interacting with marine management and science professionals,** and **presenting a management plan/proposal (orally and in writing).**

**Course Outline**

<u>Week</u>	<u>Lecture Topic</u>	<u>Readings and Assignments</u>
1-Tues (1/5)	The state of the oceans	Ch 1 and 2
1-Thurs (1/7)	Why Marine Conservation: A history	Knauss 1990; Sloan 2002. <i>Cons Bio</i> ; Montero-Serra et al. 2018
2-Tues (1/12)	Life in the sea: ecological differences b/n land & sea	Ch 3, 4, Crowder et al. 2006;
2-Thurs (1/14)	Marine disease; Habitat destruction/habitat loss	Ch 9, 10; 12; Bruno et al. 2007; Miner et al. 2018 ; (supplem: Hewson et al. 2014); <b>Outline due</b>
3-Tues (1/19)	Fisheries declines and marine extinctions	<b>Homework due</b> ; Ch 5, 13; Pauley et al. 1998;
3-Thurs (1/21)	Bioinvasions in the oceans – <b>Brian Turner</b> , PSU	Jackson 2008; McClenachan et al. 2006;
Sun (1/24)		Ch 8; Carlton and Geller 1993; Gerald et al. 2019; Lin et al. 2019 <b>Quiz #1 due</b>
4- Tues (1/26)	Fisheries lecture (part 2); Work session for term papers and <b>In the news</b>	<b>Connect with your project community partner!</b> Ch 17, 20; McClenachan 2009;
4-Thurs (1/28)	OR Territorial Sea Plan and Coastal Mgmt: <b>Deanna Caraciollo</b> , OR DLCD	Territorial Sea Plan –on d2l; and TBA
5- Tues (2/2)	MPA implications on PNW Tribes: <b>Sabra Comet</b> , <b>SSNERR</b>	<b>Homework due</b> ; Lepofsky and Caldwell 2013
5- Thurs (2/4)	Changing ocean conditions, <b>Jennifer Fisher</b> , NOAA	Kintisch 2015; Bond et al. 2015, Peterson et al. 2017
Sun (2/7)		<b>Quiz #2 due</b> ;

<b>6- Tues (2/9)</b>	Oregon Marine Reserves, <b>Dick Vander Schaff</b> , TNC	Lester and Halpern 2008; Carr et al 2017; (suppl: Burt et a 2018; Brock 2012)
<b>6- Thur (2/11)</b>	<b>Midterm</b>	<b>Midterm in class; Rough draft due; FRIDAY</b>
<b>7- Tues (2/16)</b>	OR MR Evaluation 2023: <b>Lindsay Aylesworth</b> , ODFW	<b>Return rough draft peer reviews</b> ; Ecological & Human Dimensions Monitor Plans; Caveen et al. 2012
<b>7- Th (2/18)</b>	Current state of Wave Energy: <b>Matt Sanders</b> , Pacific Ocean Energy	<b>Homework due</b> ; Khan et al. 2017; POET – PDFs (link and pathway provided on d2l);
<b>8- Tues (2/23)</b>	Calamity in the Kelp; <b>Steve Rumrill</b> , ODFW	Barton et al. 2015; Multiple Stressors Considerations
<b>8- Thurs (2/25)</b>	W. Coast Ocean Acidification Policy Development: <b>Charlotte Regula Whitefield</b> , ODFW	<b>Term paper due</b> ; Boehm et al. 2015; Somero et al. 2016; OA documents in Week 8 folder
<b>9- Tues (3/2)</b>	State of Federal Ocean Planning and Policy, <b>Sarah Winter</b> , <i>The Littoral Society</i>	National Ocean Policy Implementation Plan; other readings TBA
<b>9- Thurs (3/4)</b>	International Law, Policy and Practice	Readings on d2l;
<b>Sun (3/7)</b>		<b>Quiz #3 due</b>
<b>10- Tues (3/9)</b>	<b>Student presentations</b>	
<b>10-Thurs (3/11)</b>	<b>Student presentations</b>	<b>Op ed due (Grad students)</b>
<b>Exam Mon(3/15)</b>	<b>Final exam</b>	<b>10:15-12:05 am</b>

## Assignments

**Attendance and Participation:** You are expected to attend and participate in class sessions; 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. Group discussions will be held during the 2nd part of lecture on multiple occasions. For these discussions, you will be assigned scientific, working group, and/or technical paper(s) to read. During the session, the class will discuss the paper and the findings. If you actively engage in the dialogue, you will receive full credit for discussion that day. If you attend these discussions, but do not participate verbally, you will receive partial credit. If you miss these sessions, you will receive no credit. This is true for guest speaker and lecture sessions as well.

**Homework and Readings:** For journal articles read for weeks 3, 5, and 7, you are required to turn in a brief (150-300 words) response to the articles answering the following questions:

1. What was the most interesting thing you **learned** from the articles?
2. How does the information therein build on, complement, or contradict other issues we have discussed or read?
3. How can the information in the article(s) be applied to management, conservation, and or policy?
4. What article(s) would you recommend be included in addition to **or** in place of the current articles for the week.

## Readings

**Textbook:** *Marine Conservation Biology*, by E. A. Norse and L.B. Crowder (2005; Island Press)

**Other reading:** Articles will be provided via website: <http://d2l.pdx.edu/>

## Papers

The papers or links to them are available on d2l. Required papers are listed above. You'll need an ODIN account to access library materials and D2L. If you don't have one, go to: <https://www.account.pdx.edu/>, call (503 725 4357), or email ([help@pdx.edu](mailto:help@pdx.edu)) the office of information technologies help desk.

### **D2L Quizzes**

To assist students in keeping up with class content and better prepare students for exam content, there will be 3 online d2l quizzes (during weeks 3, 6, and 9). You will be able to take each quiz twice.

**Speaker questions:** For at least 5 of our **external** guest speakers, each student must come prepared to ask a question to the speaker. If time runs short and you are not able to ask your question, you can submit it in writing at the end of class. However, each student needs to **orally ask a question to at least 3 of the speakers.**

**Management Term Project:** Select from one of the projects below. Conduct your project **with your group** in and mostly outside of class. Each group will develop an outline to address the topic, produce both a rough draft and final written product, and give a brief (~15-20 min) group presentation to the class. The presentation must have no more than 25 slides. Each student should expect to spend ~35-50 hours working on the project throughout the term (including meetings, research, writing). The **outline** should include: the goal of the project, methods to be used, expected project outcomes, initial literature review. Please include a timeline *agreed upon by the group* in your outline. Teamwork is an important aspect of professional work in environmental science and management. Therefore, **IF your group fails to work together to complete the project and you have not come to me by Thursday of Week 5 to attempt to work through issues your group is having, each member of your team will be penalized 10% on your final paper grade and final presentation grade.**

**Written product:** Groups will submit an outline, rough draft, and final paper (5-7 pages) not including tables, figures, and citations.

**Presentation:** Each group will give a ~15 minute presentation, with 3 minutes for questions using power point. **All group members should present during the presentation.** The presentation should serve as a mini-lesson for your peers about the topic as well as reporting findings to the relevant agency or organization (most years community partners are able to Zoom in to the final presentations).

**Exams:** There will be one midterm exam and one comprehensive final exam. The final exam will be based on all material covered in class, **including student and guest presentations.** Questions will include definitions/short answer and essays. The final will be weighted more heavily than the midterm to encourage retention and synthesis of course materials.

**Op Ed:** Graduate students are required to identify a current marine conservation, management or policy issue and write an op ed. Students should identify the target audience/media outlet of the op ed. Op eds should be 200-300 words and written in an op ed format (engaging, responding to or addressing an issue).

<b>Grading component</b>	<b>485%</b>	<b>585%</b>
Attendance and Participation	3	3
Homework & readings	3	3
Speaker questions	3	3
Quizzes	6	6
Midterm exam	17	15
Comprehensive exam	22	19
Management project: outline	2	2

Management project: rough draft	2	2
Management project: peer review	2	2
Management project: written product	25	25
Management project: presentation	13	13
Management project: evaluations	2	2
Opinion editorial (op ed)- Grad only	0	5
Total grade	100	100

### Management project topics:

*#1: Project Title:* The perfect storm: exploration of possible management options to address warming ocean, massive numbers of sea urchins, decline of kelp beds, and starving abalone along the southern Oregon coast

*Agency Partner:* **Steve Rumrill, ODFW**

*#2: Project Title:* Mass mortality and recent designation of “Critical” status for west coast populations of the Sunflower star (*Pycnopodia helianthoides*): identification and assessment of possible conservation actions to facilitate recovery

*Agency Partner:* **Steve Rumrill, ODFW**

*#3 Project Title:* Coastal Acidification and the effects of land/sea interfaces on OA in estuaries

*Agency Partner:* **Charlotte Regula Whitefield and Caren Braby, ODFW**

This includes land-based pollutants/run-off as co-stressors to OA and impacts of estuary residence times and freshwater gradients on OA.

*#4 Project Title:* Ocean Acidification and the impacts of a multi-stressor environment

*Agency Partner:* **Charlotte Regula Whitefield and Caren Braby, ODFW**

This includes looking at how multiple impacts of ocean change can impact ocean ecosystems – HABS, Temp, upwelling, hypoxia, etc.

*#5 Project Title:* **Setting Expectations: Species Response to Marine Reserves over Time**

*Agency Partner:* **Lindsay Aylesworth, ODFW**

The ODFW Marine Reserves Program is responsible for the management and scientific monitoring of Oregon’s five marine reserve sites off the coast. Marine reserves are areas in Oregon’s coastal waters that have been reserved for conservation and scientific research. All extractive activities are prohibited in the reserves including fishing and ocean development. The selection of each reserve site was a trade-off in meeting ecological and socio-economic goals; the reserves had to be large enough to allow scientific evaluation of ecological effects but small enough to avoid significant adverse social and economic impacts on ocean users and coastal communities. The ODFW Marine Reserves Ecological Team is working on messaging to share with the public about the ecological expectations of the marine reserves. One of the ecological monitoring objectives is to detect long-term change at each site and understand if it relates to marine reserve protections or changing ocean conditions (e.g. nearshore hypoxia, climate change). We have yet to draft the messaging around our focal species responses to marine reserves over time. Select one fish, invertebrate and algae species from the focal species list provided by the ODFW Marine Reserves program. Explain ecologically how you would anticipate these species populations to change over time in the short

term (<10 yrs), and long-term (>10 yrs), based on the protection of a marine reserve in temperate waters. What factors influenced your predictions? Do we expect the same response at each reserve? Select two of OR's marine reserves and explain if any of these ecological expectations change based on what is known about the specifics of the chosen reserves. Things to consider include reserve size, available habitat, oceanographic conditions, and prior fishing pressure.

**#6 Project Title: What is the socioeconomic impact of marine conservation in Oregon?**

Agency Partner: **ODFW, Tommy Swearingen**

The Marine Reserves Program is tasked with assessment of the socioeconomic impacts of Marine Reserve implementation. To address this mandate, data have been compiled from Census Bureau American Community Survey (ACS) data for all of the coastal Oregon communities for the years 2009 to 2019. Due to the size of the communities and Census Bureau procedures, most of these community data are estimates, normally five year running averages. However, some estimates vary widely and improbably between years for specific communities. To address this variability, variables with large standard deviations have been dropped. In addition, small communities with unusually wide variations for the retained metrics were also eliminated. The resulting database consists of 8 socioeconomic variables for all coastal communities with reliable data.

The task at hand is to cover the following:

- a) Other than proximity to reserves, decide how would you match potential control and treatment groups for comparison.
- b) Identify which variables are most important for these comparisons. Matching is only relevant for the years prior to marine reserve implementation, which changes based on the community or group of communities you are analyzing. Two reserves were implemented in 2012, two in 2014, and one in 2016. Thus treatment and control groups must be by marine reserve location and date of implementation.
- c) How could you weight the control communities to create a composite synthetic control (references will be provided)? Should you group treatment communities (e.g., all treatment communities near a marine reserve that was implemented in 2012 are grouped together? Or should you analyze treatment communities separately?
- d) Explain how you would analyze the variance between treatment communities and the synthetic control over time to see if statistically significant differences exist among these variables that might indicate a marine reserves effect.

The goal here, given these data, is to look at the characteristics of individual communities to see if they match. What are your matching criteria for this study, and what communities would you put in treatment and control groups? Which community data are probably unreliable? How would you test for statistical differences between communities? Then explain your logic and show how you would implement the analyses.

**#7 Project Title: Awareness and perceptions of marine reserves in Oregon?**

Agency Partner: **ODFW, Tommy Swearingen** From prior research, we know that awareness of the Oregon Marine Reserves is increasing ([Epperly et al, 2020](#)). However, we also know there is a divergence among the general public related to perceived and factual knowledge of the reserves ([Perry et al, 2014](#)). A simple participatory GIS study could test perceived marine reserve spatial knowledge. In an online survey, we would a) gauge respondents' awareness of Oregon's marine reserves; b) include a follow up question about how knowledgeable they feel about the reserves (perceived knowledge), with a measure of certainty; c) a set of questions would then test marine reserve factual knowledge, such as the number reserves and the management agency ([Needham et al, 2016](#)). Lastly, we would have the GIS component where participants must place five dots that represent marine reserves along the Oregon coast, testing their spatial knowledge. This study could supplement both the [OSU](#) and [PSU](#) studies and the [ODFW visitor surveys](#).

A simple mapping exercise can be included in a Qualtrics survey (<https://github.com/pkmmnct/qualtrics-google-map-lat-long>), facilitating a one-stage survey. However, it will be slightly more complicated than just creating a typical question in Qualtrics. It appears that you have to add JavaScript code to Qualtrics to accomplish this task. This website link has all the code written out.

## #8 Project Title: **West Coast Policy Analysis of Subsea Cable Standards**

**Agency Partner:** Department of Land Conservation and Development, Oregon Coastal Management Program

-Deanna Caracciolo (direct point of contact); Heather Wade; Andy Lanier

### **Project Description:**

Oregon territorial sea has a long history of extensive and diverse uses. Currently over a dozen telecommunication cables land on Oregon's shore, all of which cross economically rich fishing grounds, important recreation locations, and historical on modern cultural significant sites. These cables are regulated by a network of state, federal and local entities, all of which may evaluate different components of a project. Your task is to evaluate, compare, and contrast the policy frameworks utilized by West Coast states to evaluate and regulate subsea cables, and the environmental, economic, and social factors considered when planning cable routes. This analysis can be synthesize a report or other creative outlet.

### **Policies**

**Late policy:** Your grade will be reduced by 10% per day if late and late assignments will be accepted for 1 week past the deadline; also there will be a delay in my grading of late work. Extension requests must be made >36 hrs before the assignment due date.

**Illness policy:** If you're sick and unable to come to class, please work with me to figure out how to compensate for missed class and email me or upload your assignments as they're due (if you didn't ask for and receive an extension).

**Email policy:** I will return emails within 48 hrs given no unforeseen circumstances.

**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: <http://www.pdx.edu/dos/codeofconduct>

Also, if you have not already done so, please go through the on-line training for creating a safe, respectful campus: <https://d2l.pdx.edu/d2l/home/425907>

Please consult the Purdue OWL regarding plagiarism and other writing issues: <https://owl.english.purdue.edu/owl/resource/589/01/>

### ***Resources & Services:***

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

Consult the Purdue OWL re: **plagiarism** and other writing issues: <https://owl.english.purdue.edu/owl/resource/589/01/>

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

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. Please arrange with the DRC ahead of tests and send me a prompt to send them the test if required.

Resources for students can be found at: <http://my.pdx.edu/students/resources-across-campus> including Writing Center: for class assignments, resumes... <http://www.writingcenter.pdx.edu/> Cramer rm 188; Free Tutoring...: <http://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/>; Multicultural Centers: <https://www.pdx.edu/dmss/multicultural-student-center> ; <https://www.pdx.edu/dmss/native-american-student-community-center> ; <https://www.pdx.edu/dmss/la-casa-latina-student-center> ; LSAMP (Louise Stokes Alliance for Minority Participation in STEM) 103 Epler Hall <http://www.pdx.edu/lisamp/home>; Queer Resource Center: [www.pdx.edu/queer](http://www.pdx.edu/queer); Food pantry: <https://sites.google.com/a/pdx.edu/psufoodpantry/>; Office of Veterans Services <https://www.pdx.edu/veterans/veterans-services>

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.