CIEE Perth, Australia

Course title:	Conservation Biology
Course code:	BIOL 3001 FREO
Programs offering course:	Biology and Ecology Field Studies
Language of instruction:	English
U.S. semester credits:	4
Contact hours:	60
Term:	Fall 2020

Course Description

The southwest region of Western Australia is known as a biodiversity hotspot with a large number of endemic species of flora and fauna. This course is intended to provide students with the theoretical background required to undertake practical, hands-on training in the tools and techniques of field biology and allow them to apply those skills in a variety of exercises. Students will study key ecological concepts and techniques and their implementation in the field, as well as the major issues and approaches involved in the conservation of fauna in Western Australia. Topics include: biodiversity, population biology and conservation, extinction and populations at risk, along with translocations and reintroduction of biota. The broad aim of this unit is to introduce students to some of the current issues in wildlife management in the southwest of Western Australian. Australia has many unique and diverse terrestrial vertebrate fauna, but we also have the worst record of recent mammalian extinctions. Because of Australia's unusual climate, landforms, and the rarity of many species, the management of our native wildlife presents special challenges for biologists, conservationists and land managers. The course includes a combination of intense fieldwork, lectures, tutorials and workshops.

Learning Objectives

By completing this course, students will:

1. To gain an understanding of current issues in wildlife conservation and management in Australia.
2. To be able to discuss critically the causes and effects of population decline and expansion.
3. To be able to identify the different management methods for threatened or pest species and understand the limitations of those strategies.
4. To be able to present information clearly and logically in spoken and written formats.
5. To gain experience in a field-based research project and be able to explain the rationale for the work, the methodology, results and management implications.

Course Prerequisites

This unit is aimed at students majoring in wildlife biology, biology, zoology, conservation, or other natural resource programs. Overall GPA 2.75; 2 semesters of college-level biology required; Upper-level coursework in ecology and/or zoology recommended.

Methods of Instruction

This unit covers the following topics:

- Introduction to conservation biology and its theoretical background
- Animal ethics
- Experimental research design and data analysis

- Population biology and genetics
- Habitat Fragmentation
- Primary threats to wildlife populations
- Management options

This unit comprises approximately 30 hours of class. This includes lectures, video material along with many additional presentations and guest lectures during the fieldwork. There are also a number of workshops/tutorials and field trips included covering a range of topics and activities such as field sampling and statistics. These sessions have been scheduled, with the aim of encouraging further discussion of material covered in lectures. Lectures, workshops and tutorials will be interspersed with an intensive field based research project. Students will work in groups to undertake their field based research; however project reports will be written up individually.

Lectures will be dispersed with fieldwork, tutorials and workshops. Lectures will be delivered by Adrian, Kate and guest lecturers. The guest lectures contain pertinent and up-to-date information about conservation issues and the lecturers are industry leaders in conservation and wildlife management. Lectures will be dispersed with fieldwork, videos, tutorials and workshops. You will be assessed on **all** lecture and workshop components.

Assignment submission

Electronic submission of assignments is required via Canvas.

Grading

All assessable components in the unit must be attempted. To pass the unit you need to achieve an overall mark of at least 50%.

Assessment and Final Grade

1.	Comprehensive Questions	10%
2.	Oral Presentation	15%
3.	Examination	35%
4.	Project Report	30%
5.	Participation	10%
	TOTAL	100%

Course Requirements

Comprehensive Questions

Using the literature and your own knowledge answer the following two questions (up to 500 word each):

1. Use case studies to illustrate the role of private land in conserving wildlife and engaging local communities in relation to the acceptance of conservation goals (5%)
2. Explain why landscape connectivity is important for conservation and using examples show how it can be achieved (5%)

Oral Presentation

For this exercise students will work individually. Each student will need to identify an endangered Australian species, highlight the major threats and management plans in place for their chosen species. You will give a 12-15 minute presentation with added time for questions.

The oral presentation will be assessed according to:

- Content (relevance; organisation – introduction, body, conclusion; clarity)
- Presentation (manner – non-verbal communication; voice; language; use of audio/visual aids)
- General (understanding of audience; timing).

Examination

There will be a 2-hour closed book exam at the end of the module. The examination will be designed to test your achievement of the unit objectives as a whole. It will consist of:

- 20 multiple choice,
- 10 short answer questions; and
- 2 essay questions.

Project Report

The individual project will be from the fieldwork/data collection. These reports are to be delivered in scientific report format including typical sections such as an abstract, introduction, materials and methods, results, discussion and references. Specific projects for each student will be decided after the start of fieldwork and advice on data analysis, presentation and synthesis will be available during tutorial and study break. The format and marking guide for this report will be provided when fieldwork commences.

Participation

Participation throughout the course and engagement with field work will be assessed. Students will be graded throughout the course upon:

- Attitude
- Willingness to help other students
- Commitment to deliver high quality work
- Ability to learn and adapt
- Openness to learning
- Contributing to open discussions

Attendance

Students are required to attend all lectures and activities. Students are expected to arrive on time and participate in all class discussions, workshops, activities, and fieldtrips. Roll call will be taken and absences noted.

Course schedule is subject to change due to study tours, excursions, and local holidays. Final schedules will be included in the final syllabus provided to students on site.

Weekly Schedule

Week 1

Class 1.1 Introduction to theoretical concepts Lecture 1a & b

- Welcome and housekeeping
- Theoretical background to conservation biology
- Species richness
- Rarity and endemism

Conservation biology developed in the 1980s and is an interdisciplinary unit drawing on the biological sciences, the social sciences and natural resource management with the aim of protecting and restoring species, their habitats and ecosystems. This module will begin with an overall introduction to this unit including general house-keeping and logistics for both fieldwork and classes. Following on from this we will delve into the theoretical background to conservation biology including how it developed as a discipline and its importance. Lectures will also be given on key concepts including species richness, rarity and endemism.

Readings

1. Barry, D. and Oelschlaeger, M. (1996), A Science for Survival: Values and Conservation Biology. *Conservation Biology,* 10: 905–911. doi: 10.1046/j.1523-1739.1996.10030904-2.x
2. Soulé, M.E. (1995) What is Conservation Biology? *BioScience* Vol. 35, No. 11, pp. 727-734

Class 1.2 Populations & Genetics Lecture 2 & Workshop 1

- Population biology
- Conservation genetics
- Populations at risk
- Vulnerability and extinction

Lecture 2 examines population biology and conservation genetics. The final part of this lecture will look at population risks including vulnerability and extinction with particular attention paid to case studies from the south west of WA. A workshop will be undertaken to explore the many issues faced by populations at risk.

Readings

1. Lindenmayer, D. & Burgman, M. (2005) *Practical Conservation Biology* CSIRO Publishing, Collingwood, Victoria (Chapter 6 & 7).

Week 2

Class 2.1 Principles of Ethical Research Lecture 3a & b

- Experimental design
- Animal ethics

Conservation biology draws upon research methods and problems solving skills from a variety of disciplines. This module will begin with learning on animal ethics. The

Animal Welfare Act (2002) requires that all use of animals for scientific purposes must be first approved by a properly constituted Animal Ethics Committee. Students will be expected to understand how to design research that complies with the various codes of practise for conducting research with animals. Following on from this the basic principles of experimental design will be explored. Primary focus will be on measuring diversity including field procedures for data collection, analytical and statistical procedures for data analysis along with models to predict abundance.

Readings

1. Ratti, J. T., & Garton, E. O. (1994). Research and experimental design. *Research and management techniques for wildlife and habitats. Fifth edition. The Wildlife Society, Bethesda, Maryland, USA*, 1-23.
2. Sinclair, A. R. E. (1991) Science and the Practice of Wildlife Management. *The Journal of Wildlife Management*, Vol. 55, No. 4, pp. 767-773

Class 2.1 Wildlife Populations Lecture 4 & Workshop 2

- Studying wildlife populations – measuring abundance, estimating abundance
- Case studies from south-west of WA
- Field based research

This lecture will use case studies from the south west of WA. A major component of this module will be the undertaking of fieldwork in Manjimup in the south west of WA. This will include the trapping and releasing of native species. Lectures will also be given as well as workshops on animal handling. Field based research will commence in Week 2.

1. Wayne, A.F. & Moore, J. (2011) The Jewel in the Crown: Perup and the Upper Warren. *Landscope* pp. 12-17, Department of Parks & Wildlife
2. Wayne, A.F., Maxwell, M. A., Ward, C. G., Vellios, C.V., Wilson, I.J., Dawson, K. 2013, Woylie Conservation and Research Project: Progress Report 2010–2013, Department of Parks and Wildlife, Perth.

Assessment Due: Comprehensive questions

Week 3

Class 3.1 Primary threats to biodiversity Lecture 5

1. Human impacts
2. Habitat degradation, fragmentation
3. Threats to wildlife including introduction of exotic species, land clearing

Biodiversity loss is a key environmental issue. Human activities result in impacts on the environment. The drivers of change include climate change, population growth, economic development and associated consumption of our natural resources. All of these need to be carefully managed if a sustainable relationship between biodiversity and humans is to be achieved. Threats to biodiversity at global and local scales will be discussed including changes in the physical environment from climate change, loss of populations and species, introduction of exotic species, habitat modification and loss.

Readings

1. Lindenmayer, D. & Burgman, M. (2005) *Practical Conservation Biology.* CSIRO Publishing, Collingwood, Victoria (Chapters 9 & 10).
2. State of the Environment 2011 Committee. Australian state of the environment 2011. Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities. Canberra: DSEWPaC, 2011. (chapter 8 Biodiversity p. 567).

Class 3.2 Biodiversity & Climate Change Lecture 6

- Biodiversity and influence of climate change
- Field based research

This lecture continues to focus on biodiversity loss as a key environmental issue with a focus on climate change as an important driver of change. Field based research will also continue to be undertaken in week 3.

Readings

1. Dunlop, M., & Brown, P.R. 2008. Implications of climate change for Australia's National Reserve System: A preliminary assessment. Report to the Department of Climate Change, February 2008. Department of Climate Change, Canberra, Australia.

Assessment Due: Oral Presentation

Week 4

Class 4.1 Management for Conservation Lecture 7

- Why/How do we conserve?
- Adaptive management
- Translocation
- Ex situ conservation
- In situ conservation
- Importance of legislation
- Where to in the future?

Effective management of our environment is dependent upon an understanding of all major components, the key processes that underpin its functioning and an understanding of its response to impacts and disturbance. This lecture explores the differing management options for our many conservation problems. A key strategy is adaptive management as it can absorb and adjust to accommodate future changes. Other management techniques including include translocation, conservation ex situ and in situ. This lecture will also discuss the need for policy and science in conservation biology. The development of better management and conservation practices is dependent upon the appropriate policies and legislation being put in place.

Readings

1. Lackey, R. T. (2007), Science, Scientists, and Policy Advocacy. *Conservation Biology*, 21: 12–17. doi: 10.1111/j.1523-1739.2006.00639.x

2. Robertson, D. P. and Hull, R. B. (2001), Beyond Biology: toward a More Public Ecology for Conservation. *Conservation Biology*, 15: 970–979. doi: 10.1046/j.1523-1739.2001.015004970.x

Assessment Due: Project Report

Course Materials

Readings

Lindenmayer, D. & Burgman, M. (2005) *Practical Conservation Biology*. CSIRO Publishing, Collingwood, Victoria.

Groom, M.J., Meffe, G.K. and Carroll, C.R. (2006). *Principles of conservation biology.* Sinauer Associates Inc., Sunderland Massachusetts. Third Edition

Barry, D. and Oelschlaeger, M. (1996), A Science for Survival: Values and Conservation Biology. *Conservation Biology*, 10: 905–911. doi: 10.1046/j.1523-1739.1996.10030904-2.x

Dunlop, M., & Brown, P.R. 2008. Implications of climate change for Australia's National Reserve System: A preliminary assessment. Report to the Department of Climate Change, February 2008. Department of Climate Change, Canberra, Australia.

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Lackey, R. T. (2007), Science, Scientists, and Policy Advocacy. *Conservation Biology*, 21: 12–17. doi: 10.1111/j.1523-1739.2006.00639.x

Ratti, J. T., & Garton, E. O. (1994). Research and experimental design. *Research and management techniques for wildlife and habitats*. Fifth edition. The Wildlife Society, Bethesda, Maryland, USA, 1-23.

Robertson, D. P. and Hull, R. B. (2001), Beyond Biology: toward a More Public Ecology for Conservation. *Conservation Biology*, 15: 970–979. doi: 10.1046/j.1523-1739.2001.015004970.x

Sinclair, A. R. E. (1991) Science and the Practice of Wildlife Management. *The Journal of Wildlife Management*, Vol. 55, No. 4, pp. 767-773

Soulé, M.E. (1995) What is Conservation Biology? *BioScience* Vol. 35, No. 11, pp. 727-734

State of the Environment 2011 Committee. Australian state of the environment 2011. Independent report to the Australian Government Minister for Sustainability, Environment, Water, Population and Communities. Canberra: DSEWPaC, 2011. (chapter 8 Biodiversity p. 567).

Wayne, A.F. & Moore, J. (2011) The Jewel in the Crown: Perup and the Upper Warren. *Landscope* pp. 12-17, Department of Parks & Wildlife

Wayne, A.F., Maxwell, M. A., Ward, C. G., Vellios, C.V., Wilson, I.J., Dawson, K. 2013, Woylie Conservation and Research Project: Progress Report 2010–2013, Department of Parks and Wildlife, Perth.