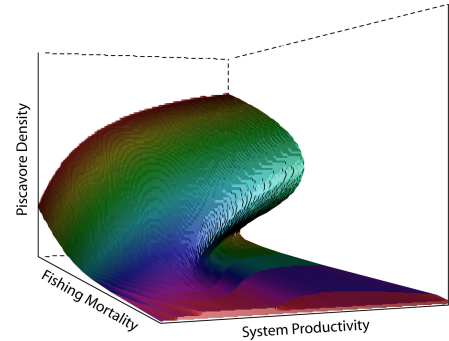


Management of Exploited Populations
FAS 4932/6932
University of Florida
School of Forest Resources and Conservation
Fall 2018
Credits: 3
Prerequisites: Introductory Statistics, Calculus 1, General Ecology.



This course introduces you to the theory, methods, and tools required providing advice as a biologist/ecologist in applied settings. Applied application of biological/ecological principles may be required to make prediction about potential impacts on natural populations. General categories of impacts on natural population are habitat destruction, pollution, invasive species, climate change, and harvesting. In this course, we focus primarily on the impacts from human use of natural resources with a focus on terrestrial and aquatic animal populations. Choosing to focus on the impacts of harvesting is by no means arbitrary. Human harvest can have a profound impact on the dynamics and persistence of natural populations. Furthermore, decisions made during the management of such resources have profound impacts. when

COURSE HOURS

Monday Period 4-5 10:40-12:35 McCarty B 3108
Wednesday 4 10:40-11:30 McCarty B 3108

INSTRUCTORS

Robert Ahrens rahrens@ufl.edu
Office McCarty C Room 402
Office Hours TBD

Bill Pine billpine@ufl.edu
Office Building 87 Room 1
Office Hours TBD

Purpose: Lectures will explore the theoretical basis for developing mathematical models to describe population/ecosystem dynamics and how such models can be utilized to explore management options. Practical experience developing and implementing models will occur during computer laboratory sessions. Our overall purpose is to review modern ideas concerning the management of renewable natural resources. Emphasis is on populations and ecosystems as dynamic, changing entities that may respond in curious ways to human disturbances. We will focus on the dynamics of exploited populations, ecosystems, and their management. Lectures and Labs are organized under four headings:

- Analysis of exploited populations
 - Unit stock concepts and problems of population definition
 - Harvest response paradigms
 - Components of population change
 - Analysis of sustainable yields
 - Harvest strategies and tactics
 - Age-dependence in harvesting
 - Abundance estimation
- Human dimensions: effort dynamics, bio-economic theory

Harvester behavior
Equilibrium theories of optimum economic practices

- Ecosystem Management
 - Trophic dynamics
 - Multi-species management
- System approaches to environmental assessment and management
 - Identification of problem components
 - Looking outward and cross-impact analysis
 - Development of interdisciplinary cooperation

FORMAT

One face to face lecture & lab combined (Monday). One face to face lecture each week (Wednesday).

REQUIRED MATERIALS

There is no required text for the course. You are required to have a laptop computer (see computer information below). There are substantial online materials on the web to assist you with statistical calculations. Additional readings will be provided on the course Canvas site for particular topics. Below are reference texts that contain much of the information this course covers.

Books and people that shape the ideas taught in the class:

Holling, C. S. 1978. Adaptive environmental assessment and management. ISBN 1932846077

Walters, C. J. 1986. Adaptive management of renewable resources. ISBN 1930665431

Hilborn R. and M. Mangle 1997 The Ecological Detective. ISBN 0691034974.

Otto, S. P. and T. Day. 2007. A biologist guide to mathematical modeling in ecology and evolution. ISBN 0691123446

Case, T. J. 2000. An illustrated guide to theoretical ecology. ISBN 0195085124

Hilborn, R and C J Walters 1992. Quantitative fisheries stock assessment. ISBN 0412022710

ELECTRONIC COMMUNICATIONS

Course materials will be available through the Canvas e-learning site (<https://lss.at.ufl.edu/>). You will find links for the syllabus, assignments, lab data and lecture presentations as well as quizzes and assignment submissions. Presentations may not be available prior to class and it is your responsibility to take notes. On occasion, an email will be sent to you via Canvas regarding updates to the syllabus, clarifications of assignments, or changes in due dates. If you aren't doing so already, you should be checking your Canvas email on a regular basis.

EVALUATION AND PERFORMANCE CRITERIA

| Evaluation Method (Number) | Points | % of total |
|--------------------------------------|---------------|-------------------|
| Assignments (12, 10 points each) | 120 | 75% |
| Lecture mid-term exam (1, 20 points) | 20 | 12.5% |
| Lab final exam (1, 20 points) | 20 | 12.5% |

Letter grades will be assigned as follows:

A (94-100), A- (<94-90), B+ (<90-87), B (<87-84), B- (<84-80), C+(<80-77), C (<77-74), C-(<74-70), D+(<70-67), D (<67-64), D- (64-61), E (<61)

A complete explanation of the UF Grading policies can be found at <http://www.registrar.ufl.edu/>

At the very minimum, the student is expected to attend class, complete all assignments on time, and actively participate during class discussions. A general 'Grading rubric', which describe requirements of the assignments and the criteria used for evaluation, will be available. If you are unclear about assignment expectation you should consult with one of the instructors. UF attendance policies can be found at http://www.registrar.ufl.edu/catalogarchive/01-02-catalog/academic_regulations/academic_regulations_013_.htm. Unexcused late work or absences will result in a loss of

points. Exams will not be rescheduled for unexcused absences. Arrangements to make up missed exams or turn in late assignments for excused absences must be made with the professor in advance of the due date.

DESCRIPTION OF ASSIGNMENTS

Assignments

The purpose of the assignments is to gain experience linking basic ecological concepts from lecture with applied problem solving techniques used to inform management decisions. At the end of the assignment you will be required to submit a lab report that will be due the Friday following the lab on Wednesday. Each submission will be worth 10 points in total.

Exams

The exams are intended to evaluate your understanding of the conceptual material, and to demonstrate your critical thinking and problem solving skills in applying these concepts and techniques under a variety of sampling scenarios. The format of the exam will be multiple-choice and require calculations, graphing, matching, fill-in-the-blank, and short answer selection.

PARTICIPATION

As a natural resource professional, you are expected to assume the responsibility of choosing when absence from class or lab is to your personal or professional advantage. Whatever reason may justify your absence, you are entirely responsible for obtaining the information for absence from the exams (of course some situations merit exceptions). Students are encouraged to show their engagement with this class through attendance, class contributions, and enthusiasm.

Software Use:

All faculty, staff and students of the University are required to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate.

General computer guidelines

For this course you will need to have access to Microsoft Excel (or similar spreadsheet), R, and possibly MARK. You may need to install the Solver function and the analysis tool-pack (both free).

There are also cloud based versions of Excel available to students here <http://info.apps.ufl.edu/>

And there is an IFAS virtual computer lab that has everything you need. You can log in to this with any device and use R, Office, MARK, etc.

<http://cals.ufl.edu/lab/virtual-lab.php>

We may use the free program R. There are R builds for PC, Mac, Linux, etc. R can be downloaded here

<http://www.r-project.org/>

We will also use "R studio" another free program that makes R a little easier to use. It is available for Mac, PC, or Linux here

<http://www.rstudio.com/>

Just download the free desktop version.

There are other text editors available also for free for R, just look around the web.

A version of the Windows operating systems and Microsoft Office can be obtained very cheaply (or for free) via the UF computing portal

<http://helpdesk.ufl.edu/>

UF Guidelines

The official UF computing guidelines, which relate to all aspects of hardware, software, and network information at UF are available here

<http://helpdesk.ufl.edu/>

The following is the official UF policy on the student computer requirement:

Access to and on-going use of a computer is required for all students to complete their degree programs successfully. The University of Florida expects each student entering the junior year, as well as each student new to the university, to acquire computer hardware and software appropriate to his or her degree program. Competency in the basic use of a computer is a requirement for graduation. Class assignments may require use of a computer, academic advising and registration can be done by computer, and official university correspondence is often sent via e-mail.

A note about the use and sharing of computer code

In this course you are expected to complete your own labs, including building your own spreadsheet, writing your own R code, or other computer program to help you complete the analyses and provide the information needed for writing the lab report. Writing your own program or spreadsheet is a key part of the lab assignment. To be successful you must learn what the pieces of the code are actually doing. Please do not attempt to re-use someone else's computer code. Re-use of someone else's code and data would constitute a violation of the academic honesty policy for both parties and result in a zero on that assignment and likely referral to academic affairs. Bottom line, do your own work.

A few references

Via our CANVAS page we will provide links to copies of book chapters, monographs, and peer reviewed literature. For review of basic statistical concepts, we recommend

<http://www.khanacademy.org/> and <http://onlinestatbook.com/> from Rice University, both are free and are outstanding resources.

The manual for Program MARK is a great reference for mark-recapture with lots of examples and tutorials. It is available for FREE online at:

<http://www.phidot.org/software/mark/docs/book/>

There are TONS of R resources on the web

<http://www.r-project.org/>

check YouTube, check our CANVAS/Canvas page, check the library, look around....

Academic Honesty:

As a result of completing the registration form at the University of Florida, every student has signed the following statement: "I understand that the University of Florida expects its students to be honest in all their academic work. I agree to this commitment to academic honesty and understand that my failure to comply with this commitment may result in disciplinary action up to and including expulsion from the University."

All students are expected to abide by the Student Honor Code as described in the Student Handbook (<http://www.registrar.ufl.edu/catalog/policies/students.html>). Students are expected to behave in a professional and courteous manner towards instructor and other classmates. This includes turning off AND putting away your cell phone during class.

Plagiarism (<http://web.uflib.ufl.edu/msl/subjects/Physics/StudentPlagiarism.html>) is taken very seriously at this institution, and can result in a reduced grade, failure of the course, and possible dismissal from the college. Plagiarism includes: 1) the direct use of any written material (including internet sites!!) without proper quotations and citation or 2) the submission of a document, in part or wholly authored by someone other than the student. It is up to the professor to evaluate the severity of any infraction and to determine the disciplinary action to be taken. The student should also be aware of his/her legal rights as defined in the Student Honor Code.

UF Counseling Services:

The University of Florida provides excellent resources on campus for students having personal problems or seeking additional career and academic assistance to help them realize their full potential. The University cares about you and your well-being and being a successful student requires mental and physical health. We want you to be successful. These resources include:

1. University Counseling Center, 301 Peabody Hall, 392-1575, personal and career counseling; <http://www.counseling.ufl.edu/cwc/> The Counseling Center also provides extensive help with anxiety stress management through a variety of innovative and free programs. Take advantage of these resources sooner rather than later! <http://www.counseling.ufl.edu/cwc/tao>
2. Student Mental Health, Student Health Care Center, 392-1575, personal counseling;
3. Sexual Assault Recovery Services (SARS), Student Health Care Center, 392-1161, sexual counseling;
4. Career Resources Center, Reitz Union, 392-1601, career development assistance and counseling; <http://www.crc.ufl.edu/>
5. Students working with the Office of Disability Resources should provide their accommodation letters within the first 10 days of class. If you are unsure what resources Office of Disability Resources can provide then visit their web page to find out more. <http://www.dso.ufl.edu>. Accommodations include extended test taking time, alternate format exams, and other types of accommodations developed cooperatively with the Office of Disability Resources, the student, and faculty.

Unsure where to turn for help? Come see us. We want you to do well in this course and want to see you succeed as a student, a professional, and in life.

General Schedule – Note this is tentative and will be revised based on course progress and opportunities that arise unexpectedly.

| | Topics | Quizzes & Assignments |
|-----------------------------|---|-----------------------|
| Week 1 Aug 21 Aug 23 | Lecture (M) Intro and Applied vs Traditional Ecology Lecture (W) Making prediction Lab (W) Balance models in Excel | |
| Week 2 Aug 28 Aug 30 | Lecture (M) What is a population Lecture (W) Patterns in population dynamics Lab (W) Problem structuring and decomposition | Assignment 1 due |
| Week 3 Sep 6 Sep 8 | Lecture (W) Paradigms of population response Lab (W) Harvest management Lecture (F) Paradigms of population response | Assignment 2 due |
| Week 4 Sep 11 Sep 13 | Lecture (M) Density dependence Lecture (W) Density dependence Lab (W) Age structure analysis | Assignment 3 due |
| Week 5 Sep 18 Sep 20 | Lecture (M) Underlying biology of density dependence Lecture (W) Underlying biology of density dependence Lab (W) Fitting simple relationships | Assignment 4 due |
| Week 6 Sep 25 Sep 27 | Lecture (M) Underlying biology of density dependence Lecture (W) Underlying biology of density dependence Lab (W) Bag and size limits | Assignment 5 due |
| Week 7 Oct 2 Oct 4 | Lecture (M) Harvest regulation and tactics Lecture (W) Harvest regulation and tactics Lab (W) Bionomic equilibrium | Assignment 6 due |
| Week 8 Oct 9 Oct 11 | Lecture (M) Effort dynamics Lecture (W) Effort dynamics Lab (W) Meta populations and gravity models | Assignment 7 due |
| Week 9 Oct 16 Oct 18 | Lecture (M) Estimating N direct counts and closed N Lecture (W) Estimating N direct counts and closed N Lab (W) Leslie depletion estimators and likelihoods | Assignment 8 due |
| Week 10 Oct 23 Oct 25 | Lecture (M) Estimating N open population models Lecture (W) Index of abundance standardization Lab (W) Surplus production models and Bayesian Stats | Assignment 9 due |
| Week 11 Oct 30 Nov 1 | Lecture (M) Estimating Mortality Lecture (W) Lab (W) Fitting Catch curves, Bayesian statistics | Assignment 10 due |
| Week 12 Nov 6 Nov 8 | Lecture (M) Mark Recapture Lecture (W) Mark Recapture Lab (W) CJS models | Assignment 11 due |
| Week 13 Nov 13 Nov 15 | Lecture (M) Adaptive management Lecture (W) Lab (W) Decision analysis | Assignment 12 due |
| Week 14 Nov 20 Nov 22 | THANKSGIVING HOLIDAY NO CLASS | |
| Week 15 Nov 27 Nov 29 | Lecture (M) Structured decision analysis Lecture (W) Lab (W) Structured decision lab | |
| Week 16 Dec 4 | Lecture (M) TBD Lecture (W) Lab (W) Lab exam | |

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| Dec 6 – Class ends | | |
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