

# **Solving the Mysteries of ESRM 494, 495, and 496**

## **A Survival Kit for Students in the ESRM Wildlife Conservation Option**

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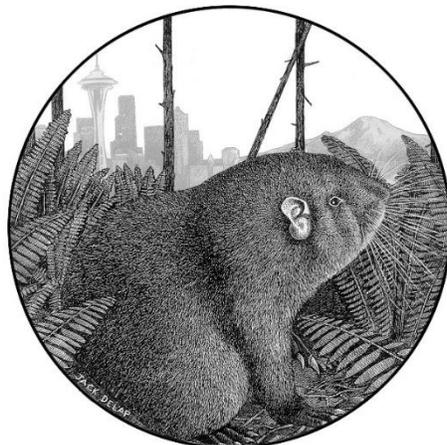
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October 2019



## THE SENIOR CAPSTONE EXPERIENCE

Upper division students in the Wildlife Science Option have the opportunity to pursue a topic of personal interest and put to use principles and techniques learned previously. There are two options for completing the capstone requirement: (1) Senior Thesis, and (2) Senior Project. Those in the honors program or interested in furthering their education in graduate school are advised to pursue the Senior Thesis route because it provides direct research experience. Those students less certain about their future career goals can do a Senior Thesis, but may find the Senior Project more appropriate. Senior Projects do not require completion of an independent research project, and instead may consist of a report or other deliverable (e.g., outreach materials) from an internship, teaching/mentoring, or other career-relevant experience.

During your junior year, you should consult with a wildlife faculty member to decide on the type of experience you wish to pursue and the topic area in which you are interested. Although the choice of a topic is open, we have instituted a set of guidelines to provide a pathway through this unfamiliar territory. Faculty members are interested in your projects and will help you arrive at a realistic project design. Because it is very easy (and frustrating) to spend a lot of time thinking about projects that on closer inspection are unrealistic to accomplish with available resources and time, it is important that you seek advice about potential projects early on. Initial discussions should be about ideas and research questions. Subsequent discussions can turn to logistics. The choice of which faculty member to approach is usually done with respect to their areas of scientific expertise, rather than their roles as academic or program advisors.

After you have decided on a project, you will prepare a study proposal under the Senior Proposal (ESRM 494, 5 cr.). In winter quarter of each year, juniors will be invited to enroll in ESRM 494. All current wildlife faculty members will meet with the class at the start of the quarter to tell you about their study interests, potential projects you may wish to join, and to answer your questions about which type of experience may best suit you. This step will sharpen the focus of the project, give you time to research the pertinent literature, give you experience writing a proposal, and make clear to all the nature of your project.

During your senior year, you should determine which faculty member you wish to work with and sign up for either The Senior Thesis or Project (ESRM 496 or 495, 5 cr.), which allow for conducting the research, data analysis, and write-up, as appropriate for your topic.

## A NORMAL SEQUENCE OF EVENTS

Discuss project ideas and their feasibility with one or more faculty members



Gather information from many sources (e.g., libraries, faculty, peers, and professional biologists) on potential projects



Decide on a general research area and whether the Thesis or Project option is most suitable



During the Junior Year, with guidance from faculty prepare and submit the project proposal (ESRM 494)



Revise proposal as needed and gain faculty approval to proceed with Thesis or Project



During the Senior Year, with regular faculty (or internship mentor) guidance complete research for the Senior Thesis or Project



Write and submit Senior Thesis or Project

## ELEMENTS OF THE CAPSTONE PROPOSAL

Your proposal should clearly state the nature of your project, your approach to complete it, and the methods you will use for it. In many cases, we suggest that you write the proposal as you might write a scientific paper, emphasizing the literature review and consideration of methods as these will be directly transferable to your thesis or project writeup. Explanations of the rationale for this structure and suggestions on how to use it effectively are provided in Day and Gastel (2006)<sup>1</sup>. In practice, the structure of research proposals varies a great deal, depending upon the desires of the granting or contracting group. Despite the variation, most proposals contain similar information. We request that your proposals be structured with the following sections:

### **Title Page**

Please see the attached sample title page for the proposal (page 8).

### **Abstract**

Provide a concise, indicative abstract of 200 words or less. An abstract should state what you propose, why it is important or interesting, and how you intend to proceed.

### **Introduction**

The Introduction should set the stage for the project. It provides the background needed for the reader to understand the question or problem you will be addressing, why it is important, including a selective but thorough literature review of the chosen topic, and your general approach to the problem.

### **Objectives**

In this section you should concisely state what question(s) you are addressing. Note that the rationale for these questions should have been provided in the Introduction. The questions might take the form of simple statements or formal hypotheses for statistical inference, depending upon the nature of the project.

### **Proposed Methods**

You may find it convenient to subdivide this section. For Theses, common divisions include Study Area, Field Methods, and Analytical Methods. Carefully describe the field, laboratory, and analytical methods you plan to use. Are they the most appropriate ones? Where competing methods exist, justify your choice. Cite references for each. Will cooperators be involved? What will be their roles? For Projects, there may not be a need to detail research methods, but you should clearly state what it is you will be doing, why it is appropriate, how it contributes to your future goals, and what methods you may learn about.

### **Anticipated Outcomes**

In this section, you should describe the nature of your anticipated results. For Theses, what do you expect to find (e.g., hypotheses and predictions)? For Projects, what do you

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<sup>1</sup> Day, R.A. and B. Gastel. 2006. How to write and publish a scientific paper. 6<sup>th</sup> Edition. Oryx Press. 320pp.

hope to gain? You should also briefly explain how you expect your thesis findings or project activities will further wildlife conservation or management efforts.

### **Research Timetable**

Provide a time schedule of when you expect to conduct each part of the study. This can be done effectively in a chart of tasks vs. time. Make sure you allow enough time for fieldwork, data analysis, and report preparation. Final reporting will consist of the written report and a public presentation, which is required for all ESRM capstone courses. The presentation may be a talk or a poster.

### **Literature Cited**

List all references you cite in your proposal. Use the author and date system followed by several journals (e.g., *Conservation Biology*, *Ecological Applications*, *Journal of Mammalogy*). Write out journal names in full. For example:

Jones, E.J. 1986. The winter diet of the Blue Grouse in the Cascade Range. *Journal of Wildlife Management* 45: 187-195.

Although the length of proposals will vary with the intent of the project and the nature of their authors, proposals have averaged about 10-15 double-spaced pages historically. You should submit a draft of your Proposal two weeks prior to the deadline for review and feedback.

## **SENIOR THESIS OR PROJECT GUIDELINES**

You should write your thesis or project for a scientific journal. Because there are several variations in format among journals and we would like to have a standard format for all Wildlife Science Senior Theses and Projects, we request that you follow the general format of *Conservation Biology*. This journal offers a very readable format and an accessible style for cited literature, where journal names are written out in full.

A characteristic of thesis or journal writing is conciseness. Everything is said efficiently, and with few exceptions, it is said only once. Your thesis should consist of the following sections, each of which (with the exception of the Abstract) may be subdivided as you see fit:

### **Title Page**

Please see the attached sample title page for the thesis (page 9).

### **Abstract**

The Abstract is a single-paragraph summary of your thesis. It should be an informative summary of 250 words or less and should (1) state the general problem/question being addressed; (2) describe the methods employed, (3) briefly summarize the main results, and (4) state the principal conclusions and their implications.

## Introduction

The Introduction should provide the reader with essential background to understand the problem or question being addressed, the reason for doing the research, and the hypotheses or predictions. It should review the pertinent literature to orient the reader, but the introduction is not a place for a lengthy review of the topic. The objective of your study should be clearly stated in this section. Approximately 5-6 paragraphs should be sufficient.

## Methods

The Methods section tells precisely what you did. It should be sufficiently detailed that the reader can judge whether your methodology is appropriate and can replicate your study if desired. In wildlife research you will often have to design specialized equipment. If your methodology is unconventional, you may want to defend it in the Methods section with explanations and literature citations. The length of the Methods section can vary substantially depending on the complexity of the study.

## Results

The Results section clearly and simply reports the data of your thesis, or the experiences gained through your project. Reasons for collecting these data are given in the Introduction and your assessment of what they mean is given in the Discussion to follow. **Do not include discussion or interpretation of your data in the Results section.** Data can be cast into tables or shown in graphs depending on their nature<sup>2</sup>. If the data are not extensive and can be given in the text, please do so. Provide descriptive statistics and a full report of inferential statistics if used. In the presentation of data, strive for efficiency. Instead of “It can be seen from the data in Figure 2 that abundance was higher in spring than fall” try “Abundance was higher in spring than fall (Figure 2).” If you have data you wish to include with your thesis that are too voluminous for presentation in the main body of the thesis, you can add them as Appendices after the Literature Cited section. The results section is typically about 2-4 paragraphs long.

## Discussion

In the Discussion section, you interpret the results. **Do not simply repeat results in the Discussion.** For theses, try to answer two related questions: What do the results mean? Why did they come out the way they did? For Projects, tell us what was most useful from your experience and why. Make sure you keep Results and Discussion separate in your mind. The results are facts—what happened. The discussion is opinion- why you think it happened and what you think it means. Relate your findings to the work of others, with proper citation. Do your results and theirs agree? Why or why not? The Discussion section should be as well documented with literature citations and as well reasoned as you can make it. In a long thesis a Conclusion section can be useful. It is not a summary, which should not be necessary in most theses, but draws conclusions from the results and discussion. What do you want the reader to take away from your study? The Conclusion offers broad, interpretative statements of what the study has shown and how the information might be used in practice and in further research. Management

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<sup>2</sup> Briscoe, M.H. 1996. Preparing scientific illustrations. 2<sup>nd</sup> Edition. Springer, New York. 204pp.

recommendations, if appropriate, should be included in the Conclusion. Discussion sections are typically 6-8 paragraphs long.

### **Literature Cited**

The Literature Cited section includes a complete citation for every reference in the thesis or project. It should not include any publication not cited somewhere in the thesis or project (it is not a bibliography). The format of the Literature Cited section varies greatly among scientific journals. As mentioned above, we would like you to follow the citation style of *Conservation Biology*:

Jones, E.J. 1986. The winter diet of the Blue Grouse in the Cascade Range. *Journal of Wildlife Management* 45: 187-195.

The references should be listed alphabetically. If there is more than one reference by one author, list the earliest one first. If you cite more than one paper published during the same year by the same author, cite them as Jones 1986a or 1986b and list them similarly in the Literature Cited section. See a recent issue of *Conservation Biology* for other issues of format.

When citing a reference, write: "Jones (1986) found that ..." or "Similar observations have been made by others (Jones 1986; Smith and Robinson 1987)". Do not use footnotes unless in a table. Personal communications may be cited as references in the thesis text, (e.g., Aldo Leopold, pers. comm.).

### **Acknowledgments**

If you are indebted to others for any aspect of your thesis, they should be acknowledged for their help in this section.

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**SENIOR THESIS PROPOSAL (or) SENIOR PROJECT PROPOSAL  
ESRM 494 (or) 495**

TO: Name of faculty advisor

TITLE OF PROPOSED PROJECT: Title

STUDENT'S NAME: Your name(s)

PERIOD OF RESEARCH: Dates for the research

DATE OF PROPOSAL Date you submit proposal to advisor

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Student's signature(s)

**The Title of Your Thesis (or) Project Should be Here**

by

Jane Q. Wildlife

A Senior Thesis (or) Project Submitted in Partial Fulfillment  
of the Requirements for the Degree of

Bachelor of Science  
(Wildlife Conservation)

School of Environmental and Forest Sciences  
University of Washington  
Box 352100  
Seattle, Washington 98195-2100

Year

Approved by \_\_\_\_\_

Faculty Thesis Supervisor

Date \_\_\_\_\_