

# Research Paper Instructions

Principles of Biology -- Conservation Biology  
Spring 2009

**Purpose of Paper:** I want to encourage you to read on one subject in detail and moreover, to synthesize what you learn there with what you have learned in this and other courses. I also want to give you the chance to take "ownership" of part of the course instead of simply studying the topics I have deigned important.

The approaches you may use in your paper may be empirical and/or theoretical. For instance, you can write a paper based, for instance on attempts to handle a specific conservation problem or you can deal more generally with scientific, economic, or political issues and theories that relate to biological conservation.

**Assignment:** You will write an original **7 - 8 page paper** (*note difference from course information sheet and see technical specifications at the end of this document*). The paper will be on a topic of your choosing<sup>1</sup> but please note that I will approve the topic and general outline (see below). There are four restrictions on what you can do:

- It must be centered on conservation biology. Thus, **environmental biology papers** (e.g., global warming or pollution as the principle topic) **are not appropriate**. On the other hand, a paper that dealt with the effects of global warming on specific conservation issues is certainly appropriate.
- Nor should you turn in simple profile of some species ("Our Friend the Endangered Porcupine"). It is certainly fine to focus on a single species but conservation issues associated with that species must be the central emphasis. Please try to be creative and intellectually vibrant – the last offering of the course, I saw far too many papers on polar bears and penguins as their conservation related to global warming.
- You can write about economic, political, religious and cultural aspects of biological conservation. However, there still must be a major biological component to the paper -- for instance, explanation of biological issues and how they relate to say, economics and different economic theories of how to handle the conservation problem. But, I do encourage efforts to bring together several disciplines.
- The paper must not have been used for another course.

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<sup>1</sup> Please do not ask me to suggest topics. Look over your text, the syllabus, and the literature in deciding your topic. I will make concrete suggestions only when I see a well-formed idea.

Your paper must rely mainly on scholarly literature including scientific papers, reputable popular scientific articles, including from non-encyclopedia websites (no Wikipedia but you can use it as a place to do research), and respected newspaper and magazine articles. Specialized books (not textbooks) are also appropriate. You should expect to use a **minimum of eight sources** – I do not want papers that are essentially summaries of a small number of articles. **Most of the material should not be drawn from newspapers or magazines.**

I would suggest looking through the textbook, newspapers and magazines, and on-line for ideas.

The paper must contain a significant synthetic discussion (see below). Papers that are nothing more than literature reviews or whose synthesis relies entirely of what is presented in articles will receive a lower grade. In other words, think about what you read.

**Deadlines:**

**Topic submission:** You must submit a title and brief outline with at least five sources by the date given on the class website. Failure to do so will result in a 3 pt. penalty on the final project. I will let you know if the project is suitable by the end of the week at the latest.

**Help:** I am happy to look over detailed outlines, list of sources, and abstracts as long as I see these no later than Friday, 30 March. Please do not submit complete papers for comments. Also realize that help is not a guarantee of a high grade, although it certainly may help!

**Final Submission:** Submission has two parts. The entire paper must be submitted electronically no later than the start of class on the date given on the class website. In class that day you should also turn in a paper copy along with all note cards and copies of sources you used for the paper. Please put them in a sturdy, closable envelope with your name on it. This is to give me an idea of the process of your work. Papers will be marked down 1/3 rd of a grade step each day they are late (where late means that I get it after the deadline time). Thus, if you handed in an A-paper Thursday afternoon at noon the highest grade you could receive would be a B (two days late, two steps down). Of course, a Dean's excuse is acceptable for late work.

**Early submissions are encouraged – any that are turned in before Easter Break will earn a 5-point bonus.**

**Technical Instructions:**

The entire paper should be 1.5 spaced with 1" margins top and bottom, 1.25" right and left. Use 12-point "Times" face font throughout except where symbols are needed, if at all.

**Length of paper:** The text must be 7 to 8 pages in length. Papers that are shorter or significantly longer will be penalized. Getting the length correct, including and appropriate amount of information (for instance, not stretching out a small amount) and writing clearly, succinctly and in an organized manner are important parts of the assignment. Sometimes this will involve altering the scope and/or refocusing the paper.

**Please note that the length of the paper does not include the title page nor does it include figures or the literature cited.**

**Format and style:** Scientific writing, like any other expository prose, should be clear, concise and accurate. Its clarity should be such that I or another student in the course can understand everything that you are trying to say. Conciseness should be such that you could not say the same thing with simpler phraseology or fewer words. Accuracy should be such that your words convey exactly the meaning you intend without being vague or ambiguous.

**Organization:** The paper must have the following sections:

- **Title page** with title and your name and the course name and year.
- **Abstract** - a concise summary of the paper without references included. No more than 150 words.
- **Introduction** - a short section that outlines your project - the question you are addressing and how you intend to answer it.
- **Literature review** - an organized presentation of the literature that you have reviewed, all aimed carefully at your main question.
  - **No quotes may be used; everything should be paraphrased into your own words.**
  - All material summarized from articles must be footnoted (see format below).
  - Good scientific writing is not typically a paragraph with a citation at the end. **Nor is it useful neither to rely primarily on one article nor to use that article to find earlier ones and then cite what you have just read in the first one.** You will see plenty of examples of how to write in the articles you read. Pay particularly close attention to the writing in the introduction and discussions of those articles.
- **Discussion** - Please try to confine your synthesis and ideas to this section. It typically will be 1-2 pages at the most. It is OK to put forth some of your ideas in earlier in the literature review as long as it is clear that is what you are doing and it makes the most sense to do so. Try to minimize restating material from earlier except with very brief summaries or references to earlier material. Making judgments about the weakness of strengths of studies you have previously discussed is a valid thing to do in the Discussion.



**Comments on Content:** Your paper should be substantive, reviewing the major facts, studies, interpretations and areas of controversy for the chosen topic. It should be more than a series of reports on different articles strung together. You should organize and synthesize the material in a meaningful way. Ideas and statements should be supported as needed by results of studies or logical arguments. Inconsistencies between studies should be noted and reconciled where possible. Sometimes it may be appropriate to critique the methodology of particular studies. Much of this should be handled in the discussion, unless it is more convenient for explanatory reasons to handle it in the literature review.

**Give your paper a clear focus and organization.** The introduction should make clear to both the writer and reader the scope of the paper and the major points to be covered. The body of the paper should be logically organized and this organization should be apparent to both writer and reader. Exclude material that is not clearly tied to the goals of the paper. (This does not mean that you should exclude material with which you do not agree or that contradicts other work. Such information should be included and critically evaluated. Irrelevant material is that which does not bear on the major points raised in the paper.) The conclusion should draw together and summarize the major points.

### **Citations:**

In text, use last name of up to two authors followed by the year (no coma) (e.g., Hauser 2000 or Steward & Martin 1974). If there are two authors separate the names with the "&" – do not write out "and". For more than two authors cite the first author only followed by **et al.** and the year (e.g., Prestwich et al. 1987).

Please note that it is common to cite two or more articles as authorities for the same statement. When you do this, separate the citations for the different papers by either a comma if they are by the same author – (Prestwich 1982, 1983 or Prestwich 1982a, b for two articles by the same author the same year) – or by a semicolon if they involve different authors (Walker 1988; Forest and Raspert 1992).

### **In the "Literature Cited" section:**

Journal articles should be cited as:

Bailey, W. J., P. C. Withers, M. Endersby & K. Gaull. 1993. The energetic cost of calling in the bushcricket *Requena verticalis* (Orthoptera: Tettigoniidae: Listroscelidinae). *Journal of Experimental Biology* 178, 21-37.

Books should be cited as:

Fletcher, N. H. 1992. *Acoustic Systems in Biology*. Oxford: Oxford University Press. 333pp.

Articles or chapters in edited books should be cited as:

Bennet-Clark, H. C. 1995. Insect sound production: transduction mechanisms and impedance matching. In *Biological Fluid Dynamics* (ed. C. P. Ellington and T. J. Pedley), pp. 199-218. Cambridge: The Company of Biologists Ltd.

Webpages should be cited as:

Walker, T. J. & T. E. Moore. 2004. Singing Insects of North America. [http:// buzz.ifas.ufl.edu/](http://buzz.ifas.ufl.edu/)

(Active links need not be added – the publication year usually can be found on academic web pages).

Do not include any references that you do not cite in the text.

Use no footnotes in your paper.

A recent issue of the journal Ecology (in the Science Library) can be consulted for further details of format.

**Figures and Tables:** Each figure must have its own legend. If you choose to put figures or pictures in the text (I recommend this) just be certain that your text is long enough (see "length of paper", above). Figure legends do not count in the paper length so add them after you are sure the paper is long enough (if any are long). In the same regard, do not include descriptions of figures in both the text and legends and in any case, keep the descriptions as succinct as possible. Use only text and tables that are truly needed. This is not an art project.

A few additional points of scientific format should be followed: Include scientific names for any specific species that you mention (capitalize the genus, italicize both genus and species). Common names are not capitalized.

Report any units of measurement in metric. The English equivalents can be included or omitted.

**Grading:** Several factors will figure into the grade of the paper, including the following:

- How well the instructions in this handout are followed
- The extent and quality of the reference material used
- The content of the paper, especially the documentation, synthesis and analysis of relevant material
- Organization, clarity and conciseness of writing
- Adherence to format criteria noted above
- Evidence of care in proofreading and editing (be better than me!)

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**More Help: Here are some additional help regarding the paper (kindly given by Prof. Robert Bertin for his " Principles of Biology -- Environmental Biology" class.**

**Topic Selection:** Choosing a good topic is critical to the success of the paper. Choose a topic that is neither too broad nor too narrow. Any topic about which whole books have been written, or which occupies a chapter or even several pages in the text, is certainly too broad. You will be summarizing other authors' summaries and have insufficient space to devote to detailed, critical analysis. In contrast, any topic for which you are unable to find at least several original studies is likely to be too narrow. The best topics have substantive and sometimes controversial issues that demand careful analysis, synthesis or comment.

Consult your text, lecture notes, newspaper and magazine articles or online sources for ideas. Once you have a tentative topic, you will need to do a certain amount of research to decide whether sufficient source material of an appropriate type exists for your paper.

**Research:** After selecting a tentative topic, search for relevant books, journal articles and appropriate on-line sources.

While some information remains beyond the reach of web-based searches, the speed and ease of the latter make them the appropriate first step in research. The Holy Cross library website provides access to several of these. To access this website, select Academics from the Holy Cross home page and then select libraries from the Academic Resources menu on the right side of the screen.

One of your options on the library home page is "Electronic Databases". These are searchable electronic indexes that guide you to published literature relevant to your search topics. Databases vary in terms of which journals and other sources they cover and whether they provide the full text of an article, the abstract of an article, or simply a reference.

For general magazine and newspaper content, as well as for general coverage journals, a good place to start is Academic Search Premier. By clicking on the name of this database, you will bring up a search screen in which you can enter terms that you wish to search. You can also limit your search in various ways. If you specify Full Text as one of your options, you will pull up only those sources for which you can get the full text electronically.

You can find additional search engines by selecting those databases in the library's list that are listed under Environmental Studies or under Biology. BioAbstracts is the most comprehensive database for biological subject matter, but feel free to explore any of the databases that seem relevant to your topic. Use of most of these databases is self-explanatory, and instructions are available online.

One useful hard copy index is Science Citation Index. One set of volumes is published each year, consisting of several different indexes, including a subject index and a citation index. Look up your subject in the Permuterm Subject Index. All entries are of two words, the first appearing in larger print and at the top of each page (e.g. for a paper on deterioration of agricultural soils you might look at entries for: SOIL erosion, WIND erosion, SOIL productivity, etc.). The Science Citation Index is particularly useful in finding references to recent papers that have cited an older paper in the field. Thus, if there is an important 1990 paper on your subject, note the author's name and look it up in the Citation Index for years since 1990. Any papers that have cited the earlier work will be listed.

Some topics may require you to obtain information that is not at Holy Cross. As a Holy Cross student, you can use journals in libraries of the other Consortium schools, and you may have access to other libraries near your home. If you need to find a source for a particular periodical, try the following approach. Go to Electronic Databases as described above and then click on WorldCat, which will bring up a search screen. Type the name of the journal in the upper left field and select Title Phrase for the upper right field from the menu. Check the box for Serial Publications in the "Limit type to:" section and then click Search at the bottom. A list will appear and the journal you specified will typically be the first item in this list. In the entry for that journal, click on Libraries Worldwide. A new list will appear, first listing Holy Cross, if the journal is in our library, then listing other libraries within the consortium that hold the publication, followed by other libraries in Massachusetts. If you wish to extend the search beyond Massachusetts, click Display All Libraries, and a list separated by state will be produced. You may request copies of articles from consortium libraries or non-consortium libraries. The former are available more quickly and without a fee. The latter may take 1-3 weeks and may involve a fee so be sure that you have enough time to take advantage of this service (or simply don't use it).

The search engine Google and its more academic counterpart, Google Scholar, may also provide valuable information. The former will reveal many web-only materials as well as some information from newspapers, magazines and journals that also have hard-copy equivalents. The latter is based largely on hard copy material in the scholarly literature, some of which is available in full text.

**More about webpages (added by KNP)** – remember that our class has a webpage with links to websites that I can vouch for as being generally accurate. This page can found as a link on the top of our class homepage.

For any research paper, but particularly for papers on issues subject to much opinion and interpretation, a consideration of the source of your material is absolutely essential. Be especially alert for materials that are

tied to groups with a particular agenda and make sure this connection is taken into account if the information is included in your paper. Also be aware that most scientific journals are peer-reviewed, meaning that anything they publish has been examined by scientific reviewers as well as one or two editors and has been deemed acceptable. Most material posted on the web has not been peer-reviewed and may or may not be accurate. Your paper is likely to contain a mixture of source material of different types. In general, the closer that you get to the primary literature (i.e. the original studies that describe a particular phenomenon), the more confident you can be that the story is correct.