

Marine Biology Senior Seminar – Proposal Format

Length: 8-10 pages – Worth 20 % of Your Grade – Due December 15

Proposals will be submitted to the instructor via email (to khyrenba@gmail.com, using “MARS4910 – proposal” in the subject title). Late work will be penalized by 10 % per day. All assignments must be turned in to complete the course.

The format we have developed for this course is a general one that includes sections required for the vast majority of proposal. Proposals always have page limits that are generally strictly enforced. This proposal will be limited to 10 pages not including the reference lists and figures / tables.

The proposal should be written clearly and concisely throughout. Avoid complicated sentence structure and jargon as much as possible, and strive to make your text simple and concise. To the extent possible, use figures and tables to illustrate the sampling design and time-line of the research.

The goal of this exercise is to design a research project to test one or more explicitly stated hypotheses. Do not focus on the way the specific techniques work, but rather on outlining the hypotheses and the predictions, and making sure your experiments have controls. Feel free to run through the different scenarios of how you would expect your data (relationships) to look like, and to tie these fictitious results with specific predictions and hypotheses.

10 points - Cover Page & Summary (1 page, does not count towards page count)

Add a cover page, showing your name, proposal title and a brief summary describing the proposed project and the anticipated results and benefits. As much as possible, focus the discussion of the outcomes and impacts of the proposed research on the management of marine ecosystems and the principles of EBM.

The proposal must contain a brief summary statement, spanning up to one page of text and including no tables or figures, describing the proposed activity and the anticipated benefits. The project summary is the first thing that reviewers read. It should outline the problem, objectives, activities and expected project outcomes. It should be informative to persons working in the same or in related fields and, insofar as possible, understandable to a scientifically or technically literate reader. The project summary should not be simply an abstract of the proposal, but rather a self-contained description of the proposed activities that would result if the proposal were funded.

It may help to structure the summary into three sections and to explicitly state:

- “This research will test the hypothesis that (develop a technique to)...”
- “We will test this hypothesis by (develop this technique by)...”
- The purpose of testing this hypothesis (developing this technique) is to...”

15 points - Introduction – Scientific Background and Rationale for your Research
(Limit to no more than 2 pages)

The Introduction section should include both the **background**, or the scientific context for the research, and the **rationale**, or the reasons stimulating this specific project. The background section of a research proposal should describe what is already known about the subject of your work and provide the ancillary information necessary to place your proposed research, and the new information to be gained from it, within the broader context of existing scientific knowledge. A brief historical review of the development of knowledge in the field is often useful. Although, you should be familiar with the literature in your area of research, it is not necessary to discuss and cite every paper published on the topic. You should however, cite and discuss the most important papers, as well as recent work that directly stimulates your research. The goal is to demonstrate that: (i) your work builds up from previous research results, and (ii) that you are familiar with recent developments in your field.

This introduction section should also include a rationale for your research that clearly describes why a particular scientific question or research objective is important. If applicable, it is a good idea to separate the proposed work into short and long-term goals, each stated in a precise and unambiguous way.

It is often useful to conclude the introduction section with a brief summary paragraph that ties the background information together with the research aims of the project. This will allow the readers to grasp the overall scope and direction of your proposed research.

50 points - Project Description – Research Plan and Methods
(Main Part of the Proposal)

The project description should outline the overall research effort (**the research plan**) and the specifics of how this plan will be implemented (**the research methods**). . The **plan** outlines the big picture goal(s) to be achieved, and the **methods** describe how they will be achieved. To help the readers digest the proposal, try to identify the smaller steps (or objectives) required to achieve each goal. The plan should list the goals and objectives in logical order (often chronologically – in the sequence they would take place in your research – or following a series of hierarchical hypotheses and sub-hypotheses).

The main idea is to show the logical flow of the research and how certain results or findings will alter that flow, by leading you down one path or another. For example: The goal of this research is to identify the best EBM practices (be sure to identify what criteria you would use: species diversity, energy flow, fishery catches, human happiness...) for species A in ecosystem X. This requires meeting several objectives: describing its demography, studying the species distribution, mapping critical habitats and potential anthropogenic threats on those critical habitats.

The objectives follow a logical order: first show that the species is in trouble, then investigate where it lives, then understand what are the important habitats it uses, and finally mapping potential human impacts on those critical habitats / time periods.

If possible, state your objectives in the form of one or more testable hypotheses with distinct alternatives. Describing your research in terms of a testable hypothesis generally makes it easier to design your research project and complete it successfully.

For example: **Ho**: species A is distributed homogeneously around Hawaii; **Ha**: species A is not distributed homogeneously around Hawaii, it inhabits deep-water coral habitats.

The **methods** section should relate back to the goals / objectives stated in the **plan**. It should include the broad design of activities to be undertaken, as well as where and when these activities will take place. If field work is a part of the research project, describe the location and the sampling to be undertaken. If laboratory work is involved, describe the laboratory facilities and techniques you will use. In both cases, make sure you explicitly describe and justify the sample sizes (sites, individuals, seasons, years). In addition, this section should include a referenced description of the methods to be used in the research. While learning the various techniques is not the priority of this proposal, you need to make sure you understand what techniques will be used to achieve what you proposed. For example: if you are surveying fish distributions, will you use divers / submarines? Will you make photographs / record sightings? What types of environmental data would you record? How many sites and replicates would you survey? Would you add any controls? This level of detail suffices for this class.

15 points - Outcomes and Impact - Expected Outcomes and Significance **(Limit to no more than 2 pages)**

Describe specifically what outcomes you expect from this work. This should not be limited to the results of testing your hypothesis and the achievement of the goals you listed in the previous sections of the proposal. While this material should be included (if it is not redundant with the previous text), this section should also define the importance of this work from a larger perspective (*i.e.*, why this work is significant to EBM).

10 points - Literature Cited **(Does not count towards page count)**

There is no minimum number of citations needed, but you will be penalized for not acknowledging previous research and findings and for not attributing specific techniques to those who developed them. **NOTE: Annotated bibliography is NOT necessary.**

Tables & Figures (Use if it helps explain your Research Plan and Methods) **(Do not count towards page count)**

Details for Specific Sections

Tables, figures and figure captions

Show all tables and figures within the body of the proposal (embedded) or at the end of the text. It is your choice. . Include a title for each table and a caption for each figure. Number tables sequentially as they appear in the text and do the same for figures.

Literature Cited:

All quoted literature must be listed, and all listed literature must be quoted.

List all references alphabetically by first author. Use the formatting of your choice, as long as you provide complete (authors, year, title, journal, issue, pages) and consistent references. Here is an example of citation formatting (from MEPS journal):

How to cite references:

Periodicals: Use standard abbreviations according to 'BIOSIS Serial Sources'. You can download a list of journal abbreviations from www.int-res.com/misc/journallist.txt or use the bibliographic database software 'EndNote'. You can obtain styles for IR journals at www.endnote.com/support/enstyles.asp

- Blowden DA, Clarke A, Peck LS, Barnes DKA (2006) Antarctic sessile marine benthos: colonisation and growth on artificial substrata over three years. *Mar Ecol Prog Ser* 316:1-6

Books: Write the title of the book in lower case, and give the publisher and place of publication. In the case of book series, give the series editor as well. Example:

- Hanski I (2005) The shrinking world: ecological consequences of habitat loss. In: Kinne O (ed) Excellence in ecology, Book 14. International Ecology Institute, Oldendorf/Luhe

Papers from books, conference reports, symposium proceedings, etc.: Give the title of the chapter, the editor(s) and title of the volume, the publisher and place of the publisher (not the location where the conference was held), and the pages of the chapter. The date of the cite must be the year of publication (not the year in which the conference was held). Example:

- West TL, Amrose WG (1992) Abiotic and biotic effects on population dynamics of oligohaline benthic invertebrates. In: Colombo G, Ferrari I, Ceccherelli VU, Rossi R (eds) Marine eutrophication and population dynamics. Proc 25th Eur Mar Biol Symp. Olsen & Olsen, Fredensburg.