

Distillation of Proposal Workshop

Today, we discussed how to write a proposal, comparing and contrasting proposals from years' past. This handout summarizes some of the major points from that discussion and is intended to serve as a guideline for when you write your proposals.

Summary

The summary should **succinctly** (1 paragraph, 5 or so sentences, no more than 1 page) convey the most important aspects of your proposal. This includes a brief (~ 1 sentence) description of the general issue being addressed and its importance, a more specific description of how that issue pertains to the region of your study, and the exact question your research will ask or hypothesis it will test. The summary is NOT the place to go into methodological or programmatic details, nor is it the place to justify your argument extensively. The summary can assume a sophisticated reader with some prior knowledge -- if the assumption is wrong, the reader will get up to speed by reading your introduction. Finally, bear in mind that, in theory, a person should be able to read your summary and have a very good idea of what your proposal is about *even if they don't read another sentence in your proposal!* The rest of your proposal should contain no surprise parameters or major research questions that your summary doesn't mention!

EXAMPLES (discussed in class):

I am going to determine if the abundances of three species of pelagic zooplankton are related to the concentration of particulate organic material (POM). I will collect zooplankton, water samples and other data from the R/V Clifford A Barnes at three stations around Hood Canal sill in Puget Sound, Washington. Understanding zooplankton-POM relationships is important because of the critical role of POM throughout the ecology of all copepods, and particularly at this site for specific physical, oceanographic, biogeochemical and ecological reasons.

This summary leaves the reader extremely perplexed. What species of zooplankton are being studied? How might zooplankton and POM concentrations be related? What does "around Hood Canal sill" mean? What does the final sentence mean? Do copepods also have a cosmological significance?

Compare the above summary to the following:

Fecal coliform levels will be determined at numerous sites to characterize the extent of fecal contamination in the Hood Canal system. Samples will be collected from R/V Thomas G. Thompson and R/V Wee Lander and analyzed via membrane filtration and culture techniques to discriminate the relative impact of a point source of fecal contamination -- the Skokomish River -

- versus a non-point source -- land runoff and agriculture -- in the Hood Canal estuary. These analyses will aid management and control of fecal contamination that can otherwise adversely impact the estuarine biota.

For the most part, this summary succeeds in telling us what the project intends to do, what hypothesis it will test and why the subject is important. It also gives us a very general description of the methodology to be used, without going into details. This summary could be improved by being a little bit more specific. For example, " at numerous sites... in the Hood Canal System" could be replaced by "at 10 sites along two transects in the Great Bend of Hood Canal to characterize the extent of fecal contamination there." In general, however, this summary conveys all the major points in the proposal nicely.

Introduction

This is the heart of your proposal and, in the Winter, will serve as a (perhaps verbatim) template for a significant part of your research paper. There are two major goals you should set out to accomplish in your introduction. First, you need to provide all the major background material that is essential to understanding the subject that your research addresses. This is not equivalent to a primer on oceanography! Limit your background to the characteristics of oceanography that are specifically pertinent to your research. Unlike the two examples studied in class, do NOT create a separate "Background" section in your introduction; this is unnecessary and often results in repetitiousness. The second major goal of the introduction is to set forth as clearly as possible the rationale behind the research you propose to do, including an exact statement of the question you are asking or the hypothesis you are testing (i.e. attempting to falsify). A statement of anticipated results and how you will interpret them is ideal. For example,

If there is a positive correlation between the distribution of coliform bacteria and the influx of river water along a transect from the mouth of the river to the entrance of the estuary, then this point source may be an important means of entry for fecal contamination. Conversely, if the concentration of coliform bacteria along a near-shore transect shows greater variability and higher average values than a parallel mid-canal transect, then the non-point sources may be an important means of entry for fecal contamination in the system.

As a general question of strategy, start your introduction broadly and refine it in each successive paragraph. Thus, you might begin with an overview of the general importance of the subject you address, referring to other literature studies and their major findings. In subsequent paragraphs, you could then hone in on the specific parameters that you think are most important to consider. For example, you could begin with a paragraph about the issue in general (iron enrichments, island formation at hot spots, etc.) and studies broadly pertinent to your question, even if not specifically in the Galapagos. This could be followed by a paragraph dedicated to such studies in or near the Galapagos. You could then outline the major findings of those studies and discuss which of those findings you will pursue further and for what reasons. After that, you could clearly state your question or hypothesis, discuss the types of data you will need to test it (as in the example at the bottom of page 2) and how you will get that data. Save the details of experimental design and methods for your "Proposed Research" section. At the end of your

introduction, your reader should have the basic background information needed to understand what you proposed in your abstract.

A FEW THINGS TO AVOID:

- Give careful thought to the organization of your introduction. If each paragraph introduces a new variable, some of which you haven't discussed already in your abstract, the effect is overwhelming. Funnel your reader to the same simplifications and conclusions you have reached! Don't let it snowball!
- Don't make statements that are so obvious or general that they are meaningless. Statements like "This research will further the ecology of euphausiids" are possibly true, but they aren't informative.
- Use references! Other research exists that has influenced the decisions you have made! Let us know what that research is, so we can evaluate it for ourselves if we want. In particular, use refereed publications, not web sites, company brochures, or (in most cases) general textbooks. It is occasionally helpful to reference specific figures from papers that have strongly influenced your thinking and project; you can even include copies of such figures in your proposal (but you must properly reference them.)
- If you make a comparison, try to be quantitative. Don't say "X is higher." At the least, say "X is higher than Y." Even better, say "X (range of values) is high compared to Y (range of values)."

The question or hypothesis you address in your research in many ways is the simplest organizing principle of both the introduction and the proposed research sections. As you are writing your introduction, always bear in mind what the hypothesis or question is that you're trying to steer your reader to. Similarly, in your proposed research, make sure that the experiments or observations you promise address the question or hypothesis that you are asking.

Proposed Research

This is the section in which you should get into the details of your experimental plan. Don't summarily launch yourself into the nitty-gritty, however. The first sentence of your proposed research shouldn't tell the reader how you will wash the glassware! Instead, start by restating your goal(s), as in the following example:

In order to determine whether the flow separation occurs north of Point Wells and an eddy forms during ebb tide, observations will be made from 3-7 April 2000 aboard the R/V Thomas G Thompson using the shipboard mounted Acoustic Doppler Current Profiler (ADCP).

Once you have clearly stated what you're trying to assess, **then** go into details about how and where you will assess it. Again, it's generally a good idea to start big and refine it. Before you tell us how you will prepare your samples, tell us what you are preparing them for! Be as descriptive as possible: discuss every measurement you will need, every station you expect to take samples at, the types of controls you have planned, etc. Certainly discuss how you will wash the glassware, if that is important -- but do it here, not at the very beginning! Don't be shy about using citations in this section, either: some of the methods you will use are standard and can

simply be referenced. It also doesn't hurt to draw schematics of sampling plans or laboratory analyses.

The details of your proposed research should not have been discussed previously in your proposal. On the other hand, make sure you don't drop a bombshell by suddenly indicating a research direction you haven't discussed to some degree already. Statements like "*Other possible transect patterns are being examined to better sample any small-scale eddy*" ARE NOT WELCOME! At this stage in the game, new variables can't be introduced and new studies can't be undertaken, if only for logistical reasons.

A final note: When you are writing your proposals, take advantage of each other, your professors and your TA to get feedback on your organization and argument. Things that are obvious to you because you've been thinking about them for almost two months may not be obvious to other people. Getting an objective perspective is likely to improve the overall proposal. On the other hand, do this early; asking for comments on a draft the day before it's due is too late.