Introduction to writing a scientific proposal

(Things my teachers never taught me, but I wish they had)
Proposals: The art of getting money to learn fascinating and important things, but you have to ask nicely…

1) Come up with a question

2) Re-cast it as a testable hypothesis or other, similar scientific formulation

3) Imbed it within the scientific literature

4) Explain why it is important enough to justify money to get an answer

5) Describe an approach, and explain how this will address the question
Not one, not two, but three proposals

1) Title: not too narrow and not too broad

2) Abstract: *NOT* part of the proposal but the whole proposal in miniature. Needs to have all the elements of the full proposal. Write it last, and make it 1 double-spaced page.

3) Main body of the proposal
Title

• Must get the attention of a wide but appropriate range of potential readers
• Formal writing is generally better than cute
• Who is the target audience?
• Pros and cons of being specific and general (species, location, method, hypothesis, etc.)
• It can be useful to have a rough title as a way to think about the proposal, then refine it later
Abstract

• Normally written last (and read first)
• Must contain all the proposal’s elements: Introduction, Objectives, Methods, Results, and Interpretation
• Some detail is good
• Introductory sentences and interpretation are essential; too often they are omitted
Body of the proposal

1) Introduction = Background => Need
2) Objectives
3) Materials and Methods = Approach
4) Evaluation = Anticipated Results
5) References Cited
6) Budget
Introduction = Background = Need

- Objectives
  - Specific
  - More
  - Progressively
  - Broadest perspective appropriate for this audience
Introduction

- The proposal must give the reader/reviewer enough background information to understand the topic. Assume that the reader is interested but ignorant.

- Lead the reader to see not only the background (what is known) but what is not known, and why that lack of knowledge is a problem. The reader must be convinced that it is important enough to resolve this question to justify spending money on it.

- This should lead the reader inexorably to the statement of Objectives. Indeed, in the well-crafted proposal the reader is anticipating these objectives and is already disposed to accept them as important.
Use of references

• We cite the published literature to:
• 1) help readers learn more about the subject
• 2) acknowledge the contributions of others
• 3) strengthen the chain of our logic

Insufficient use of references is a common problem in proposals. Just because the paper is not available as a pdf does not mean that you cannot read it! Go to the library.

Websites are to be used with great caution. Quality control varies; content may vanish.
Statement of Objectives

- Most critical part – tells the reader the core of the proposal. Keep it short and sweet.
- Be specific, and then more so!
- Try a two-step approach: “The overall goal of this study is to… Specifically, we will test the following three hypotheses…”
- Make quantitative predictions rather than “would be different” or “would show a pattern”. Be precise.
Approach = Materials and Methods

• Describe the methods in enough detail that a reader could envision what will be done.
• Provide all important details but omit irrelevant ones. What is relevant depends on the objectives.
• Sub-headings can be a useful way to organize the section (e.g., lab and field methods) but avoid numerous, short sub-sections.
Evaluation = Interpretation of Results

- If the study is well-designed, there are a limited number of possible outcomes. It is important to explain to the reader how each outcome will be interpreted.

- If there are likely outcomes that cannot be interpreted, the proposal is weak.

- If the sampling is insufficient, interpretation is uncertain, and the proposal is weak.

- How will these results specifically be applied to address the problem or need identified in the beginning? Do not leave the reader hanging!
References

- Use of references is especially critical in the Introduction and Interpretation of Results.
- Every paper that is mentioned in the text needs to be listed, and no paper should be listed unless it is specifically mentioned. This is a list of papers that you cited, not a general reading list on the topic.
- Inadequate or inappropriate references suggest incompetence to the reviewer!
References (cont.)

• In the text, cite papers thus:
• “Coho salmon tend to occupy pools and other low-velocity habitats (Bisson et al. 1988).” or “Bisson et al. (1988) reported that coho salmon…”
• Cite: (Jones 1999), (Jones and Smith 1990) and (Jones et al. 2001). Cite multiple references in chronological order (Smith 1977; Richards and Elliott 1983; Fowler 2001).
Budget

An itemized budget is needed to evaluate any proposal.

A budget also forces you to think through the approach and methods in detail (one field season or two, how many fish to tag, helpers for SCUBA, etc.)

You may envision yourself as a faculty member hiring graduate students, technicians, and other helpers, or as a graduate student doing the work.

You must budget:

- Salaries (yourself, others)
- Benefits (medical, retirement, etc. – use the UW rates)
- Supplies (boots, tags, chemicals, tools, nets, etc.)
- Equipment (items > $5000)
- Services (e.g., vessel charter)
- Travel (to and from field site, to conferences)
- Tuition (for graduate students)
- Overhead (56% for on-campus projects, 29% for off-campus projects, not charged on tuition and equipment)
The most common budget problem is... 

Inadequate period of time for the project, especially for data analysis and report preparation. If you have a 3 month field season, or a 3 month experiment, you need to budget for salaries for these “after the fact” activities that typically take a lot longer than the experiment. 12 months would be a minimum for a 3 month field study. The sponsor will want a final report, not just a jar of samples or an Excel spreadsheet!