

Poster Assignment

Ecology and Economics of Salmon Recovery, BIOL/ECON 140

Winter 2009

OVERVIEW. Working in pairs, you will evaluate a topic that integrates both ecological and economic analysis as applied to an aspect of salmon recovery of your choosing. By applying the ecological and economic principles we discuss in class and by doing literature research and some of your own basic research on the topic, you will formulate an answer to your primary question(s). You will then put together a poster that uses sound science to support this answer. We will have a class poster session at the end of the quarter at which everyone will present their posters (see syllabus).

STEP 1. TOPIC AND QUESTIONS (10 points) Due Jan. 23. Choose an aspect of salmon recovery that necessitates both ecological and economic analysis. This could be an aspect of the recent Watershed Resource Inventory Area (WRIA) 1 Watershed Management Plan that needs further evaluation, or another topic of relevance to salmon recovery in the Pacific Northwest. We will put together a list of potential topics from which you can choose. If you want to choose your own topic, please heed the following considerations. First, the topic should be current, so the popular press is a reasonable source of ideas. The Bellingham Herald and the Seattle papers frequently carry stories that are very relevant to salmon recovery. The Web is also a reasonable place to look for ideas. Keep your eyes on all these potential sources for issues or ideas that are particularly interesting to you. Keep a copy of the source article (being sure to note the source and the date). We recommend that you discuss your topic with us prior to turning in this part of the assignment.

When you decide on a topic that you would like to address, write a one paragraph statement of the ecological and economic questions that you will focus on in your poster. This paragraph **MUST INCLUDE THE FOLLOWING POINTS:**

1. The names of both members of your group.
2. A 200-250 word summary of the problem (if its from us) or source article (if you find your own), including explicit description of the 2 or 3 main points of the article.
3. An explicit statement of 2-3 questions related to ecology and economics that you would like to address in your poster. *The clear delineation of your questions is very important, because that will determine how you focus your research and poster.*

The biggest problem students usually have is narrowing down their questions to a manageable degree of focus. So, while this part of the assignment is fairly short, **it will require careful thought.** If the questions are too broad, you won't be able to deal with the underlying ecological and economic analyses required to address your topic. If you have a potential topic but are having difficulties formulating your questions, please come discuss it with us.

The article and statement are due in class on Jan. 23. We will notify you by the next class period whether or not your topic is suitable. If you want to double check with us about the appropriateness of your topic before you turn in the article and statement of questions, that is fine, but you will still need to formally turn in those materials. Similarly, if you are particularly inspired by something that we discuss in class, or something from the readings, then your one paragraph summary and statement of questions should reference the source of your questions, but obviously would not require the supporting article from the press.

Evaluate different perspectives: Environmental issues are frequently polarized along political or life-value lines. While ecology and economics are often applicable to environmental issues, they are distinct from them. These disciplines give us ideas about the causes, consequences, and potential solutions to environmental problems, but ideally ecology and economics are

themselves unbiased sciences. While some of the topics you choose could be politically charged, the point of this exercise is to evaluate the science behind them, not to take a political stand. Therefore, your research must look at all sides of the issue – not just data that support one single viewpoint.

STEP 2. OUTLINE (30 points) Due Feb. 23. Once you have your topic, it's time to do background research. Based on the questions you have outlined, use a combination of literature research and your own primary research to analyze the issues. Primary research might include (but is not limited to) determining important ecological services and censusing people about their willingness to pay for these services, using computer models to analyze the effects of different ecological or economic scenarios on salmon recovery, or calculating economic and ecological tradeoffs under different strategies of watershed use/development. We want you to use sound, well-established science to support your analyses, therefore you will need to use peer-reviewed journals for background research. If you need help getting started with this literature, come see us or talk with the reference librarians at Wilson Library about how to search the library's online databases for relevant articles. The World Wide Web can also be a useful source of data and information, but you cannot rely on it exclusively - *you must also use scientific journals*. All web sites used must be referenced.

An outline of your poster, including at least 10 background references from the peer-reviewed scientific literature, will be due in class on Feb. 23. This outline must include:

- a) Title
- b) Names of group members
- c) Abstract - written in full.
- d) Introduction - written in full.
- e) Questions - what are the 2 or 3 primary research questions you are addressing?
- f) Results
 - i. Copies of Tables and Figures numbered in the order you want to present them in the poster.
 - ii. Each should include
 - a sketch or a Xerox of each figure.
 - a table or figure legend; this must be written in your own words, not just lifted straight from the source of the figure.
 - a list of the main points illustrated in the figure. These must be written in bulleted form and they must demonstrate why the figure is important to the flow of your ideas.
- g) Conclusions - 2-3 main points, written in full.
- h) References - all references listed must be cited in your poster, and all references cited must be listed in the reference section.

See the last page of this handout for more suggestions on each of these categories.

Where you have done your own primary research, you'll need to make tables and figures you're your data. For tables and figures used as background material from the literature, these can be xeroxed from primary literature sources but the sources must be cited correctly in the table or figure legend. Text cannot be directly lifted from primary sources.

PLEASE NOTE: *This outline is a very important step in putting together your poster.* It should contain all the content of your poster written as though you were turning it in as the final copy. **THIS IS NOT A ROUGH DRAFT.** You don't need to actually put the poster together or make the figures

look fancy at this point, but the goal is for us to be able to give you feedback on the structure and content of your poster so the final version will be as good as possible.

STEP 3. THE POSTER (60 points). Now put together the poster. **All posters are due on Friday, March 13.** On that day, we will have in-class presentation of the posters. See **poster format** for directions on poster content. Numerous examples of posters can be seen throughout the research halls of the Biology Building.

STEP 4. POSTER SESSION AND POSTER PRESENTATION

Both individuals of the group must be involved in the presentation. Your individual and group grades will depend on the quality of your presentation and each person's demonstration of their knowledge of the subject matter. Attendance of and participation in the poster session is mandatory.

Evaluation

Your final grade on the poster will reflect your initial statement of topic and questions (Step 1, 10%), the completeness and clarity of your outline (Step 2, 30%), and the clarity and thoroughness of your poster and presentation (Step 3, 60%). See the Poster Evaluation sheet for the criteria used to judge the final posters. This should give you clear goals to work towards. Unless there are difficulties with participation within the group, both members of the group will receive the same grade for Steps 1-3. **As part of your poster assignment, each group member will also hand in an evaluation of the participation and efforts of the other member(s) of their group.** If there are strong, substantiated concerns about the efforts of any of the group members, these people's grades will be scaled down accordingly. If such concerns arise during your poster project, please discuss these issues with us early on if you are unable to resolve them within your group first. Waiting until the very end of the project and then saying someone didn't do their share is not acceptable. All other "group dynamics" issues should be worked out among yourselves (see below).

Working in groups

Working cooperatively in groups is a necessary skill throughout one's career, no matter what the discipline. Except for an intractable situation in which one or more of the group members is not pulling their weight, you will need to work out any personality conflicts and "group dynamics" issues among yourselves (our specialties are ecology and economics, not group therapy). But if something is going wrong, please let us know so we can deal with it early in the process. Remember, an important aspect of group dynamics is effective communication. That said, here is a simple recipe for a successful group meeting:

1. Before each meeting, agree upon clear roles for each group member. Make sure someone is responsible for making sure all necessary questions get addressed, and that someone is responsible for taking notes on the discussion, agendas, necessary tasks and duties, etc.
2. At the outset, clarify the purpose of your meeting.
3. Share the information each member has gathered since the last meeting.
4. Specifically identify the tasks to be accomplished by the next meeting.
5. Agree upon who will be responsible for both separate and shared tasks. Agree upon roles for the next meeting.

Poster format

Size: ~ 4' x 5', all on one poster board or sheet, if possible. We recommend that you design your posters in PowerPoint and print them at the Student Technology Center (650-4300), but you will need to make an appointment and will need several days lead time. Please contact the printers early so you aren't disappointed on poster day!

Title - The title should be a meaningful description of the study you did. Use large lettering - it should be readable from 6 feet away.

Names of group members

Abstract:

- ~250-300 word overview that summarizes the context, questions, results and major conclusions of the whole poster.
- Often you can put together key statements from the intro, methods, results, and discussion to construct your abstract. Of course, you will need to smooth out the writing to make it flow.
- Type must be readable from 6 feet away.

Introduction

- A short paragraph setting out the context of the poster.
- This should act as a “funnel”, starting out with the big context and gradually focusing in towards the specific questions that you will be addressing.
- Give a brief description of the context of the experiment. What big question(s) motivated this investigation?
- Present the primary hypotheses or objectives of the experiment.
- Give a brief description of the study system/area. What scale are you focusing on – local, statewide, regional, a specific project?
- In this section, and throughout the poster, try to write in the active voice rather than the passive voice.
- Be sure to cite appropriate references to set the context for your experiment.
- Type must be readable from 6 feet away.

Questions/hypotheses

- What are the 2 or 3 specific questions or hypotheses that you are addressing in the poster?
- Questions should clearly follow from the context that you provide in the introduction.
- Questions should be clearly answered by the data you present and the conclusions you draw at the end. Questions should be bulleted and in large font so that they are easily readable from 6 feet away.

Results

- This is the meat of the poster. It should be an orderly progression of data tables and figures that answer the questions you posed and that lead the viewer to the main conclusions you draw in the following section.
- You need to clearly describe your results both verbally and with figures and tables in a clear, logical order. The rules for posters are somewhat different than for papers, in that posters allow interpretation of the data in the results section, not just description. In particular you want to point out how the results relate to the original questions/hypotheses.
- Each figure should be numbered consecutively and should have a legend describing what is in that figure so that the viewer can easily understand all components of the figure (see Legend

guidelines below). Tables are also numbered consecutively, separate from the figures. The source of the figure/data/table must be cited in the legend.

- Each figure or table must also have a list of bulleted points next to it that emphasize the primary information that the viewer should glean from the data. A typical set of bulleted points would contain the following:
 1. Brief description of methods/approach used by you or the authors of the original article from which the data was drawn. Give enough methods info so that readers can understand how you or the original author got the data or did the analyses (e.g., experiments, interviews, literature review, models/calculations, what data were used, what assumptions were made). Alternatively, methods could go in the figure or table legend; see below.
 2. In 1-3 bullets, point out the main trends that the figure/table illustrates.
 3. What's the bottom line? How does this data help answer your original questions?
- You can organize your results in whatever way is scientifically logical to make the points you want to make, but a good rule of thumb is to tackle the questions you posed in the same order that you posed them in the previous section.
- Where appropriate, you may need to state the statistical significance of the differences among treatments in scientific papers. It is usually not sufficient to just say "Treatment 1 was higher than Treatment 2", without also describing whether or not those differences are statistically significant. Still, focus on the biology not the statistics. For example, some typical results sentences might be as follows:

“There was no significant difference in salmon abundances in Creek 1 compared to Creek 2 ($p = 0.19$). However, the hatchery fish formed a greater percentage of the total population in Creek 1 than Creek 2 ($p = 0.01$).”

Tables, figures, and legends

- Note: some of these guidelines are most appropriate for cases where you've gathered your own data.
- The purpose of figures and tables is to provide a quick visual summary of the data. Data should be presented with both means and some estimation of the amount of variation (standard error is best, but standard deviation is also fine). **DO NOT SHOW RAW DATA.**
- Do not duplicate data in tables and figures – use only one or the other for any given set of numbers.
- Number tables and figures according to the order in which you refer to them in the text (e.g., Table 1 is the first table referred to, Table 2 next, etc.).
- Include only tables and figures that you describe in the text.
- Make sure to label the axes of all figures, including units of measure (e.g. Distance, m).
- For figures:
 1. color can help get your message across, but too many different colors or wild color schemes can be more confusing than helpful;
 2. make sure lines and bars from different treatments are easily distinguishable;
 3. pick a simple color scheme and stick with that format throughout;
 4. many people - especially men - are red/green color blind, so it is not advisable to use both of those colors as the basis of your color scheme.
- Each table and figure should have a short descriptive legend that consists of four primary parts:
 1. Number (e.g., Table 1, or Figure 2).
 2. Title – a brief phrase that describes the main theme of the data. This phrase should not start with “This figure shows...” since that's obvious.

3. Concise text that explains any abbreviations, symbols, lines, categories, etc. The table or figure legend must give enough information so that someone can interpret your table or figure without referring elsewhere in the poster. You can include info on methods here as well.
 4. Citation – reference the source of your data if it came from one of your references.
- Put table legends at the top of each table.
 - Figure legends beneath the appropriate figure.

Conclusions

- What are the 2 or 3 main findings that you want people to remember from your poster?
- These should be well-supported by the data that you present in the Results section, and should relate directly to the questions that you posed at the beginning.
- They should be bulleted and in large font so that they are easily readable from 6 feet away.

References

- All sources must be cited appropriately (See discussion of plagiarism, below).. Here are some general guidelines.
- You must draw on at least 10 peer-reviewed sources for your poster. These references may include your textbook or other books or peer-reviewed scientific journal articles from the library or on reserve. "Peer-reviewed" simply means that other scientists have commented on the appropriateness of the methods and conclusions prior to publication.
- While you can use web sites for additional information, they must be cited properly (see below) and web sites do not count towards the 10 source minimum. Very few web sites have any kind of peer-review process to ensure high standards of scientific methodology (see the website for the Flat Earth Society for a good example http://www.alaska.net/~clund/e_djublonskopf/Flatearthsociety.htm). If you have questions about a particular site, contact your professor.
- Government reports (a.k.a. "the grey literature") count toward the 10 reference minimum. Many of these are available on-line but should be cited as regular references. Include the URL where you accessed the document however.
- Proper citation style is expected and is illustrated below. If you have any questions about this, look in any recent issue of the journal *Ecology* for examples.

Citation style within the text

When you are writing and use ideas that you gained from other sources, you need to acknowledge this by putting the authors' names and the date of their publication in the sentence. For example:

"Five interacting 'state-factors' typically influence the process of soil formation. These are climate, organisms, topography, parent material, and time (Jenny 1980)."

or:

"MacArthur (1972) has suggested that there are more species where the environment is complex and therefore more easily subdivided."

How you list the authors names in the text depends on how many authors there are:

One author (Jenny 1980)

Two authors (Smith and Jones 1897)

Three or more authors (Aber et al. 1989)

You should NOT include a page reference in the text citation for most journal articles (this will happen in the REFERENCES section at the end of your lab report). You MAY include a page number if you pulled a specific quote, fact or other tidbit of knowledge from a large book.

Citation style in the "References" section at the end

Journal article

Aber, J. D., J. K. Nadelhoffer, P. A. Steudler, and J. M. Melillo. 1989. Nitrogen saturation in northern forest ecosystems - hypotheses and implications. *BioScience* 39: 378-386.

Book

Jenny, H. 1980. *Soil Genesis with Ecological Perspectives*. Springer-Verlag, New York, New York, USA.

Edited book

Mooney, H. A., W. E. Winner, and E. J. Pell, eds. *Response of Plants to Multiple Stresses*. Academic Press, San Diego.

Chapter from an edited book

Chapin, F. S., III. 1991. Effects of multiple environmental stresses on nutrient availability and use. Pages 67-88 in Mooney, H. A., W. E. Winner, and E. J. Pell, eds. 1991. *Response of Plants to Multiple Stresses*. Academic Press, San Diego.

Government reports

Lazorchak, J. M., D. J. Klemm, and D. V. Peck, editors. 1998. Environmental Monitoring and Assessment Program-Surface Waters. Field Operations and Methods for Measuring the Ecological Condition of Wadeable Streams. EPA/620/R-94/004F. U.S. Environmental Protection Agency, Washington, D.C.

Web sites

Author. Date accessed. Web site or article title, full web address

PLAGIARISM

We don't expect this to be a problem, but we have to be clear about it up front, in conformance with Western's policies on plagiarism. Plagiarism is not tolerated. All writing must be your own (including table and figure legends) and any ideas not your own must be properly cited. If you take ideas or actual text from other sources (fellow students, books, articles, web sites) without citation, you will get no credit for the poster. With proper citation style, and writing ideas in your own words, there should be no reason for plagiarism to happen. If you have any questions, please talk with your professors, and visit Western's web site on plagiarism:
<http://www.library.wvu.edu/ref/plagiarism.html>.

Here is an example of what a poster might look like.

Poster evaluation

Group members:

Poster title:

Overall (9):

Reflected knowledge of subject matter
Answered questions effectively

Design and layout (6):

Effective
Clear
Follows a logical progression
Information is easy to find (not too much text)

Content (45 total, broken down as below):

Abstract (3)

Summarizes context, questions, findings, and conclusions effectively

Introduction (6)

Context is clearly stated and relevant to the topic
Intro appropriately leads up to questions

Questions (6)

Clearly stated
Well-focused

Figures and Tables (18)

Are appropriately referenced
Reflect knowledge of subject matter
Support the conclusions and answer the questions
Follow a logical progression of information
Are clear
Are necessary
Legends effectively describe the figures and tables
Main points of the figures and tables are clear - either bulleted or obvious from the legends or figures/tables themselves.

Conclusions (9)

Answer questions originally posed
Are well-supported by the data
Are clearly stated

References (3)

Format is appropriate
Sources are appropriate
Sources include at least 10 peer-reviewed scientific journals

Scale for above sections:

Complete, well-done: 100%

Good effort, needs some work: 85%

Present, but needs substantial work: 70%

There, but barely: 60%

Missing: 0%

Poster Group Self - Evaluation

Instructions: This form is part of your grade. Please fill it out completely, except for the two “comment” spaces, which are optional. We must have the completed form from you to be able to give you and your partner a final grade on the poster. Obviously, we expect your honest assessment of each group members’ level of contribution.

1. Your name

2. Partner’s name

3. Poster title

Questions related to grading - (We don't necessarily expect that everyone will contribute exactly equally to all components - it's the overall balance that counts).

4. How would you rank your own contribution to the poster on a scale of 1 to 100, 100 being that you fully contributed your half of the effort in terms of

developing questions:

investigating content:

designing:

putting it together:

You can give yourself more than 100 if you felt like you did a disproportionate amount of the work.
Comments (optional):

5. How would you rank your partner’s contributions (same scale as in 4)?

persons name:

developing questions:

investigating content:

designing:

putting it together:

Comments (optional):

6. Did any one member primarily take charge of the questions, content, design and execution of the poster?

