SEMINAR, SFS
23 June 1987

I. Introduction -- I'll spend 10 minutes summarizing the research I've done, and 10 minutes talking about my interests in the area of biological conservation.

II. Past research

A. Northern elephant seals -- (One general slide) I guess they're my favorite, maybe just because I spent more time with them than any other project, and also their personality, of course. (Slide -- pups on black beach) There are two main areas of their biology that make them especially interesting research subjects, and which I was involved in. (Slide of me reading tag)

1. Long fasting period every breeding season and molting season (two per year).

a. 1-3 month fast, feeding far off shore for long bouts.

b. Typical in many marine mammals.

c. Female is most extreme. (Slides -- Males fighting, female and pup)

d. I worked on the transition from fasting to feeding, including energetics and food utilization. (Slide -- pup feeding)

2. Population biology -- more relevant to conservation issues.

a. Elephant seals offer an excellent opportunity to study population recovery and regulation because of a perturbation brought about by humans. (Slides -- I. de Guadalupe) map

b. The extinction/recovery story.

c. Population change at ANI -- leveling off. (Slide -- data)

d. Density dependent pup mortality. (Slide -- data)

e. Two levels of regulation.

B. Satin bowerbirds in Australian forest, northern New South Wales, with G. Borgia. (Two slides of forest, a kangaroo)

1. Bowers, courtship, good subject for behavioral studies, sexual selection, very entertaining to watch. (Slides of birds, bowers)

2. Lots of theoretical questions on sexual selection, why the elaborate bowers, why the females choose carefully who they mate with. I worked on the use of ~~females~~ flowers as bower decorations, comparing abundance of flowers on bowers compared to in the surrounding vegetation, thinking about why certain species were valued and others never used.

3. I was more interested in a project I did mapping locations of all the bowers (you might be interested in knowing how I did that) and looking at inter-bower distances and male-male interactions.

C. I am currently working on population biology in bacteria. This might sound dull, but it's really really not. There is some wonderful natural history in the bacterial world, and some useful lessons in ecological interactions.

1. I have been studying transposons (or jumping genes) and plasmids, which are "DNA parasites" of great ecological importance, not only to bacteria, but to regular animals as well, especially humans.

2. They are accessory genes, not necessary to the bacterium they inhabit, yet capable of self-reproduction and transfer into new hosts. They're parasites but with a twist...

3. They frequently carry a function useful to their host, for example, drug resistance.

4. I believe that most of these DNA elements form a peculiar symbiosis with their host -- occasionally useful, in certain environments, other times detrimental but able to persist.

D. I've also studied forest ecology in California, looking at reproductive biology of one important fruit-producing tree, and patterns of succession involving that species and the other dominant species in redwood forest as well.

III. Conservation biology -- I've always been interested in conservation, even before I studied biology; as an undergraduate, I had one teacher who was a really good conservation scientist, and I got a good dose from his classes. I have set myself the goal of working in teaching and research related to conservation, and it is partly true (but not entirely) that my training in biology has been aimed at conservation: not because I am not interested in basic research, but because conservation issues are the most important in the world today. I think that a thorough background in basic biology (including theoretical evolutionary and ecological issues, genetics, etc.) is essential for involvement in biological conservation -- the research and teaching aspects, not politics.

A. Justification of conserving natural diversity.

1. I'm not sure I'm the one to make these arguments (this is politics) but I do think of it a lot.

2. I think it's terribly important to justify conservation in more than aesthetic terms -- it's not going to work to tell Brazilians to restrain from clearing forest because Americans think it's pretty.

3. But of course, my personal justification is not economic, but an unrelenting fascination with organisms and their natural communities. My work, my hobbies, my free time end up in the field, often to the consternation of people around me.

B. A challenge -- conservation is a political problem. Conserving species is easy -- simply don't cut the forest. What can science offer?

1. The problem is that forest cutting simply won't stop, so one thing science can offer is advice about how to

minimize the damage of development. Just measuring the damage is part of this -- proving that there will be long term, far-reaching effects of loss of habitat, not just the immediate impact of a few extinctions, erosion, etc.

2. Also, and more important economically but less interesting to me, science can show how to get more of nature's resources without damaging them. Exploration and experimentation can turn up new resources.

C. My interests in research in conservation biology are in the effects of development on species diversity, and of course, how those effects can be minimized. Particular projects:

1. Studies like the one being carried out by the world wildlife fund on optimum preserve size, or related questions on the effect of different land use practices on species diversity and extinction -- I don't think preserves are enough. Logging practices, farming practices might be made compatible with some level of conservation.

2. Succession and forest recovery.

a. Forest succession has been the major aspect of my work on plant biology (fruit disperal).

b. This is an area I would like to learn about that I see as critical in tropical ecosystem conservation. Will Australian rainforests be able to recover after being cleared (I've heard it said they won't)?

c. Studying patterns of succession in natural forests should lead to assistance in managing recovery of forests.

3. Population genetics and conservation -- I've studied population genetics for $2^{1}/_{2}$ years now often considering its importance to conservation, yet still seeing negligible application of genetics to conservation in the wild. Two questions come up.

a. First, reduction in forest area and isolation of sections should reduce genetic variability. Will this hasten extinction of species that initially survive loss of habitat?

b. Assessing existing diversity -- how many species are there, and how rapidly are they speciating? I guess I think traditional morphological studies of diversity and speciation can be greatly amplified by genetic work.

4. Long term studies of individual species are also important, not just because certain species are prized, but as lessons in the ecology and population dynamics that make up conservation. Such as elephant seals are an example to marine mammal conservation.