

## Senior Thesis/Internship Opportunities with Karen Holl

Dear Prospective Senior Thesis/Internship students,

Doing a senior thesis or internship is a major undertaking for both you and me so I like to be clear on my expectations. Completing a senior thesis is an invaluable learning experience, particularly if you are interested in research and considering going to graduate school. Likewise, doing a senior internship is a great way to get experience working with and writing a professional document for an agency. Doing a senior thesis or internship, however, is a lot more work than either ENV 190 (capstone) or ENV 196 (senior seminar), which take one quarter. Senior theses and internships require a minimum of two quarters (and often more) commitment to have the time to design and complete an experiment/project, analyze/compile results, and write up your thesis/project. They also require a high level of commitment and organization skills on your part as it is less structured than a class; you will need to set your timetable and meet it. But, like with anything, the more you put into, the more you get out of it.

Doing research or an independent project is exciting, but can also be extremely frustrating. These are research and restoration projects that have not been done before. You will inevitably have to push yourself into areas where you do not have experience, and at some point you will end up having to redo some work as you go through the learning process. But, this is all part of doing an independent project, and you will gain invaluable skills in the process. That said you need to have the background coursework to be able to do the project you propose, and I may suggest specific coursework for your project. For example, students who work on projects with an experimental or monitoring component should have taken at least one upper division course with an experimental laboratory component (e.g. Field Methods, Plant Ecology) or have some fieldwork experience.

Working with senior internship and thesis students is one of my favorite parts of my job, and I spend a great deal of time with each student. This means I have high expectations for you. I expect you to work independently, come to meetings prepared, and complete tasks by the times we agree upon. You should also be comfortable accepting constructive criticism. I make the time and energy to give you feedback to help you improve your scientific skills.

If you're interested in working with me on an independent project then make an appointment to come talk to me during my office hours. If you have your own ideas of a project that falls within my expertise, that's great. If you don't (the case for most students), I prefer you work on a project related to some of my ongoing research projects or restoration projects with which I am involved, so you can build on an existing information base and your work will contribute to a larger effort. For 2009-2010, I have several ideas for projects (see below) either related to my research on grassland restoration or to the coastal terrace mitigation/restoration project at Long Marine Lab. If you want to work with me on a tropical forest restoration study in Costa Rica during summer 2010, this requires extensive advance planning, the ability to speak Spanish, and likely raising/providing some of your own research funds. There are some possibilities for field work and I am particularly interested in working with a senior internship student who wants to develop educational materials in Spanish about reforestation. Come talk to me well in advance of summer 2010.

To be able to devote sufficient time to each student, I sponsor a limited number of students, given my other time commitments. So, the sooner you talk to me the better.

Cheers,

Karen Holl

## POTENTIAL SENIOR THESIS/INTERNSHIP TOPICS IN THE HOLL LAB

Please note that for these research projects the general questions are listed, but part of your project would be to do background research and refine the questions and experimental design. Because these projects are all part of larger research and restoration projects most of the supplies for them would be provided. The timing on these projects vary but most of them require some preparation/planning in the fall with data collection in winter/spring and data analysis and writing in spring/summer.

Grassland restoration senior thesis ideas – These projects are related to my research with Dr. Grey Hayes on the effects of disturbance on California coastal prairie vegetation. To familiarize yourself with this research please search the Web of Science for K.D. Holl and G.F. Hayes and you'll find a few of our past papers on this work.

1. Effect of clipping on direct seeding as a strategy to restore coastal prairie diversity – We have an 11-yr long research project at three sites near Santa Cruz where we have studied the effect of clipping frequency on grassland composition to inform land managers about appropriate mowing regimes. This project would entail seeding out different native forb species during fall 2009, monitoring their germination and survival and writing the thesis in the spring.
2. Decomposition of litter of different sizes – Our early results showed that clipping without raking away the clippings did not result in litter accumulation in the plots, which was a surprise. We think this result may be caused by the fact that we clip the grass into small pieces. This project would entail clipping litter to different lengths, placing it in litter bags, and then reweighing those bags at intervals to assess decomposition rates.
3. Effect of seed burial on seed germination and survival – Many coastal prairie species are seed-limited. However, efforts to add seed have met with mixed success. This study would compare seeding on the soil surface vs. burying seeds to determine whether burying seeds is a recommended restoration method.
4. Effect of slug herbivory on native annual forbs – Few studies have investigated the effect of non-native slug herbivory on the establishment of native annual grassland wildflowers, although our anecdotal evidence suggests that slugs eat many young seedlings. We would like a student to experimentally compare the effects of slug herbivory on seedling establishment which would require outplanting native forb seedlings in the fall and installing slug barriers in half the plots. Then the student would monitor the survival and growth of the seedlings through the winter and write up the thesis in the spring.

Senior internship/thesis ideas related to restoration of the Younger Lagoon Reserve (YLR) – UCSC will be expanding the marine campus at Long Marine Lab. This development is contingent on UCSC restoring grassland, coastal scrub, and wet meadow habitat on the terrace at this site, which is managed by the University of California Natural Reserves staff, in particular Elizabeth Howard. Dr. Holl is on the scientific advisory committee for this project. There are several areas of research that would be valuable to inform this restoration project.

5. Distribution of native wet meadow species as a function of water depth – Very little information exists about coastal wet meadow ecosystems. This project would be to monitor water depth and plant species composition in the wetlands at YLR in order to better understand the hydrologic distributions of these species.

6. Using *Baccharis pilularis* (coyote brush) as a nurse plant – Some shrubs have been shown to facilitate establishment of seedlings of other species by ameliorating microclimate conditions. The main existing shrub at YLR is coyote brush. The student would compare survival and growth of native coastal scrub seedlings planted under and away from coyote brush.
7. Developing a restoration monitoring protocol – Since this is the first year of the restoration, the YLR staff will be developing a monitoring protocol to use in future years to assess restoration success. The student would help to test and evaluate a couple of different monitoring approaches to inform the monitoring plan.
8. Surveying reference sites – One of the challenges in establishing restoration targets has been that the coastal habitats being restored have not been well characterized. This student would survey reference sites and compile information from the literature to help inform what are reasonable native species cover and richness targets for restoration.
9. Density of seedlings planted for restoration – Since restorationists work with limited resources there is a tradeoff between the costs and planting native seedlings densely to outcompete exotic species. This project would be comparing different densities of seedling planting and how the density affects seedling growth and survival, as well as cover of unplanted vegetation.
10. Soil solarization as an exotic control technique – One method restorationists use to control invasive exotic species is soil solarization, where sheets of plastic are placed on the ground which increases the temperature and kills the seed bank prior to planting native. This project would be to test the efficiency of soil solarization at YLR and monitor the species vegetation composition after solarization. Note that this project would be better for a student completing their exit requirement in 2010-2011 as solarization would likely be done in spring/summer 2010.
11. Impact of herbivores on restoration efforts – Survival of newly planted vegetation is imperative for the success of restoration endeavors. This project would examine the impact herbivores have on planted vegetation by comparing three treatments: rabbit exclusion (wire fence), small mammals exclusion (metal flashing fence), rabbit and small rodents (wire and metal flashing fence), and a control (open). Work would have to be done in winter (planting and fence construction) and spring (plant monitoring).