The Goodwin-Niering Center for Conservation Biology and Environmental Studies

Reflection Papers for the Class of 2003

Stefan Apse
Hofgut Brachenreute, Überlingen, Germany

My grandfather had a small farm about an hour outside of Toronto until a few years ago when he and my other relatives on the farm simply got too old to take care of the farm. My most vivid memories as a boy are on my grandfather's farm and the joy I had in such tasks as feeding the pigs, snatching eggs from the chickens, and picking cucumbers. Because of my genuine love for the farm my Grandfather dubbed me grandfather's boy in Latvian, "Opa's Puika." Since then I have always been drawn to and fascinated with farming. This past summer in Germany I got the chance to fulfill my boyhood dream of becoming the farmer that by grandfather dubbed me.

I worked on a Biodynamic farm called Hofgut Brachenreute in southern Germany in a small town named Überlingen. The farm is a 45-minute walk from the town and located on a hill that overlooks the source of the Rhine river: Lake Konstanz. The farm is in total about 90 acres, which includes oat, wheat, and rye fields, hay fields, grazing fields for the horses and cows, a barn for the pigs, and a few small vegetable and fruit cultivation areas dotted around the property. I was working with the farmer, Michael, and his present apprentice, Ulrike. Essentially the farm was an ideal small family farm, the likes of which seem no longer to exist.

My responsibilities were basically that of a farm hand. I woke up at 7:00pm, went down to the cow stall with Michael and Ulrike to clean up the manure, milk the cows and then drive them out to graze. During the day we would work on anything from collecting hay, to putting up fences, to mixing the compost heap. At night we brought the cows back into the stall for milking. Our days usually ended at 8:30pm.

Although the tasks that are described above appear to be that of an ordinary farm, this farm was rather different. The farm was a Biodynamic farm. Biodynamic farming is a type of agriculture that was founded by the philosopher/scientist Rudolf Steiner who lived in the early part of the twentieth century. He established this type of agriculture in response to the modernization of farming. Steiner called into question the use of pesticides, manufactured fertilizers, and the inadequate methods of raising animals. He claimed that this development of farming was degrading the life and nutrition of the soil, the food that was being grown, and the well being of the animals. Steiner's attitude towards farming goes beyond merely the practical.

Essentially, Steiner constructed a form of agriculture that focuses on the interconnectedness within the farm and the interconnectedness of the farm to the universe. In practice, Biodynamic

farming amounts to a self-sustainable organic farm, but the fundamental idea of Biodynamic farming broadens its perspective to a scientific spirituality. This distinction that Steiner makes through this idea of scientific spirituality is in response to the commercial sacrifice of quality for quantity. Steiner believes that the farm ought to be operated in a way that keeps the farm and the people who benefit from the farm in tune with the movement in nature and the movement of our known universe. When the farm is operated as such, the well being of the soil, animals, consumers, and earth are sustained.

I came to the internship with the sincere desire to understand the philosophy of Rudolf Steiner: Anthroposophy. Furthermore, I wanted to make strong connections between his philosophy and its practical effects on farming, thereby comparing modern commercial farming practices with the holistic approach of Biodynamic farming. The basic drive in my interest in Biodynamic farming was in bridging the gap between philosophy and our practical and daily lives, and to do it through thinking about the ethics of what we eat, where it comes from, and how it is produced.

The focus of my independent project has changed, but the fundamental idea remains the same. I am now focusing my project on the ethical treatment of animals based on the writings of the moral philosopher Peter Singer. Just before I arrived on the farm, I became interested in this topic in a class on utilitarian ethics. In this class I read Singer's arguments for the equal consideration of interests for animals: essentially, equality for animals. I found Singer's arguments to be so fantastically clear and convincing that I was, and continue to be, preoccupied with the topic.

On the farm, I participated in the treatment of the animals and observed how and in what conditions they lived. Through my experience and my preoccupation with Singer's ideas, I awoke to the complexity of animal emotions, needs, and interests. My internship experience was crucial for my thinking of the ethical treatment of animals. Additionally, my experience specifically on a Biodynamic farm aided me in thinking about the ethical treatment of animals by 1) presenting the importance of animals and their role in agriculture, and 2) allowing me to familiarize myself with what would possibly constitute ethical treatment and living conditions of farm animals.

More specifically, for my integrated project I will be thinking about the moral treatment and killing of animals with a focus on the animal food industry and the necessity or lack thereof for vegetarianism. With Professor Turner, professor of philosophy of science, I will be using the works of Peter Singer as a basis for discussing these moral issues. I will also explore other philosophers whose ideas differ from Singer's or criticize Singer's arguments. I am also interested in learning about the current state of the meat industry in order to put this issue into perspective. My internship experience was fundamental to my ability in discussing the moral treatment of animals and also in challenging and enhancing my thinking of the eating of animals.

Scott Epstein
U.S. Environmental Protection Agency, New England Regional Lab, Chelmsford, MA

During the past summer I worked for the U.S. Environmental Protection Agency, Region 1, in the Office of Environmental Measurement and Evaluation in the Ecological Assessment Unit. The two main projects that I focused on were the Clean Charles 2005 Initiative and the New England Wadeable Streams Project (NEWS). I also had the opportunity to participate in a sediment-oxygen demand study in Aroostook County Maine, toxicity testing on the Nashua River, and testing for *E. Coli*, *Fecal Ecoliform*, and *Enterococus* in the microbiology lab. Some of these samples were collected on the Charles River while others were brought in by outside groups for analysis.

The Clean Charles 2005 Initiative is a massive project that focuses on cleaning up the Charles River. Although work is being completed on all parts of the Charles, the EPA is emphasizing their work on the lower Charles from the Watertown dam to the new Charles River dam at Boston Harbor. Dry weather, total maximum daily load (TMDL), and wet weather sampling are all part of this project. Sampling took place five times throughout the summer for dry weather and TMDL combined, but no wet weather sampling occurred because the wet weather parameters were not met. The sampling locations were the same for each sampling event, marked by a buoy or Global Positioning Satellites (GPS), and water samples were collected for a variety of parameters to be analyzed back in the lab. Secchi disk readings were used to measure water clarity, transmissivity was measured with a transmissometer, and a multi-parameter YSI-Sonde (a device with multiple probes to test the water quality in the field) was used to collect information on pH, temperature, salinity, conductivity, turbidity, and dissolved oxygen. During a three day period in July testing was completed using a boom, produced by Gunderboom Inc., to see if this apparatus would be able to filter and clean the water. The idea was that the boom could be used to form a swim area, making the water inside the boom clearer (one of the major problems on the Charles) and also to decrease other water problems. Samples were taken both in and out of the boom to compare the water quality, transmissivity, and secchi disk readings.

I learned a very different method of sampling for the NEWS project, as we traveled from Southwestern Connecticut to the Canadian border sampling wadeable streams. These streams were found using only GPS and varied from somewhat polluted streams near cities or towns to pristine streams in the North Maine Woods. For this project a variety of parameters were measured with both a YSI-Sonde and by collecting samples for later analysis in the laboratory. Electroshock fishing was completed on a 150-meter section of the stream to understand the entire fish population of the stream. Fish were shocked, identified, and stored in a bucket with an aerator. If more then a base number of fish were caught then a second, or subsequent, pass was made on the stream. Macro-invertebrates were collected using a variety of techniques depending on the stream and were brought back to the lab for analysis while water flow data were measured using a dipping bar.

A great amount of time was spent doing field preparatory work to prepare for both of these projects. For the Charles project two boat teams needed to be prepared for each sampling session with the equipment for only one day, while most of the research for the NEWS project was collected during a two-week trip to northern New England. This took a great deal of planning as supplies for two weeks and backup equipment were necessary for the success of the project.

From my internship I was able to learn a variety of field research skills and the necessary steps that need to be taken to conduct field research including working on standard operating procedures (SOPs) and quality assurance project plans (QAPPs). My ability to work on two very different projects allowed me to see many differences between studies. The microbiology lab work taught me how the samples were analyzed and the other steps of field research that are not seen or understood from the field.

My senior integrative project will lead me down a different path of environmental research as I investigate the international disposal of nuclear fuel waste. I will focus my research on the European Union and the Russian bloc as I examine the disposal of nuclear waste from an environmental justice perspective. At the same time I will discuss the equity of decisions made based on Harris's definition of the "…fair and just distribution of the benefits, burdens and decision making authority associated with international environmental relations…" (Harris, x)[1]. My research will add a different perspective to the current international issue of nuclear waste disposal with a brief discussion of the policies of the United States and more focus on the Russian bloc and the European Union.

Jared Fertman
U.S. Environmental Protection Agency, Region 3, Philadelphia, PA

I spent the summer of 2002 interning for the Wetlands Enforcement Division of the Environmental Protection Agency (EPA) Region 3. The primary role of this division is to protect wetland habitats from degradation associated with development. The division works under the authority of the Clean Water Act and primarily enforces section 404 of the Act, which prohibits the addition of dredged or fill material to a wetland. While working for EPA, I experienced all aspects of the enforcement process from the initial investigation of a reported violation to the settlement and penalty phase of several trials. Due to the nature of the work, my daily activities varied greatly depending on our workload. For that reason I will describe several of the activities that I took part in even though I may not have worked on all aspects described for each case that I was involved with.

One of my main responsibilities was to assist in investigating reports of new violations. Once on site, a staff scientist and I would first determine if the area was in fact a wetland. In order to be considered a wetland three criteria must be satisfied. The first and easiest to assess is hydrologic conditions; if there is six inches of standing water on a site then more often than not the site will be a wetland. The other two conditions are a bit more difficult to assess. These conditions are vegetation and soil composition. Wetlands have a flora specifically adapted to life in saturated conditions. When on a site we would try to determine if there was a greater abundance of wetland plants than upland vegetation. This was done using a plant database that I, along with several other interns, recently updated. The final criterion that must be analyzed is the soil composition. Wetlands soils have a high content of biological material and are generally black in color. We would use a color soil chart to determine the presence of this requisite biological

[1] Harris, Paul, 2001. International Equity and Global Environmental Politics: Power and Principles in U.S. Foreign Policy. Aldershot, England: Ashgate.

material. Often these inspections were done in conjunction with other governmental agencies such as the Army Corps of Engineers and the Fish and Wildlife Service.

Once it has been determined that the site does contain wetlands we would try to determine if any dredged or fill material has been illegally added to the wetland. This was done basically by visual observations but also included soil samples. If a violation was detected we would explain the situation to the property owner or operator and give a verbal cease and desist order, which was followed up by a written order.

Once back in the office I would draft a letter requiring the violator to produce a wetlands delineation including areas that were impacted by the construction activity. This delineation was usually done by an environmental consultant. I would also draft a "308 letter", which, pursuant to section 308 of the Clean Water Act, requests information about the work that was conducted on the site. Upon receipt of an adequate delineation I would draft an Administrative Order requiring the owner/operator to restore the wetland to its original condition. If restoration was impossible mitigation at a 2:1 ratio was accepted in most cases. In cases where a civil penalty was in order, usually those that were particularly knowing and egregious, we would determine the penalty amount using a computer program that I created which could quickly tabulate a penalty amount from a few manually entered inputs. I would then draft an Administrative Penalty Order, which was sent to the party deemed culpable.

I also worked on several cases that didn't go as smoothly as the typical situation described above. For example, many wetlands violations are a result of large construction projects with several contractors on site. In these cases I, along with others in the division, would sort through the 308 responses and try to identify the culpable parties and assign penalty/restoration accordingly. Often this phase would include phone calls for clarification and warning letters to those parties who failed to respond to our 308 requests.

Finally, in instances where parties refused to accept EPA determined liability I would help prepare for trial. I worked on several cases that went, or were going, to trial. My responsibilities included witness preparation, exhibit creation and organization and input on legal briefs. I was even able to partake in the pretrial preparation for a monumental case where a developer exploited the "Tulloch loophole" in the Clean Water Act to destroy thousands of acres of wetlands in several locations. For my honors thesis I plan to explore the legal basis behind this loophole, how it was closed and how it was eventually reopened through an analysis of the relevant case law, legislation and regulation. I also will illustrate how this "Tulloch phenomenon" has affected wetlands protection, the environment and the development community since it began in the early 1990s.

The description above encompasses the majority of my daily responsibilities, but I was involved with many smaller projects. For example, I spent nearly a week on a Coast Guard research vessel to assist in water quality sampling near several offshore dumpsites. On this trip, in which we traveled from New Jersey to North Carolina, I was able to learn about water quality standards and methods for testing ocean water at various depths. I also conducted a coastal marine survey from an aircraft. I, along with a senior EPA staff member, flew at low altitudes in a small plane

from Delaware to North Carolina. We documented environmental factors such as boat traffic, fish schools, marine mammals and turtles, as well as oil spills and floating debris.

I also created and gave a power-point presentation about wetlands protection and enforcement to several groups of high school students. I focused on describing the ecological importance and fragility of these environments in order to stress the need for increased and sustained protection. I also worked on a major presentation that was given to the Regional Administrator in response to a proposal to severely cut the scope of the wetlands protection team. For this presentation we needed to show how many acres of wetlands were presumably saved each year from EPA's efforts in each of the five states that make up Region 3. We also needed to show how existing state laws were inadequate to protect wetlands from developers. Finally, we needed to create maps that delineate current and former wetland boundaries. Our data were presented to the Regional Administrator the week after I left EPA.

My time at EPA also afforded me the opportunity to work on projects that were unrelated to enforcement. For example, from time to time I was asked to review applications for permits to build upon wetlands. I analyzed the Environmental Impact Statements and determined whether the projects were designed with the most environmentally prudent intent and I commented accordingly. I also had an opportunity to work on projects with the Regional Counsel's Office. Here my primary purpose was to provide scientific and case specific support to EPA attorneys while on conference calls with accused violators and Administrative Law Judges. This aspect of my work was particularly rewarding since I plan to attend law school after graduation with the intent of becoming an environmental lawyer.

My final project, which was also extremely rewarding, was done during the last week of internship. The Regional Counsel's Office expressed concern over the legality of EPA's practice of inspecting an accused wetlands violation without a search warrant. In response to this inquiry I researched relevant Supreme Court Cases and drafted a brief that highlighted two separate legal doctrines, which were interpreted to read that wetlands were not accorded Forth Amendment protection. This task gave me the opportunity to conduct legal research that will likely be important during my honors thesis work.

Lauren Hartzell
Environment and Human Health, Inc., West Haven, CT, and Philosophy Department, Connecticut College, New London, CT

As a double major in environmental studies (science tract) and philosophy, I joined the CCBES certificate program with the hope that my CCBES experience would be able to integrate my very distinct majors. This summer I began to accomplish my goal. I divided my time between an internship with Environment and Human Health, Inc. (EHHI), a Connecticut nonprofit organization, and a research project on the precautionary principle with professor Derek Turner of the Connecticut College philosophy department. My CCBES internships exemplify the interdisciplinary nature of both the CCBES program and my interests.

Environment and Human Health, Inc.:

"Environment and Human Health, Inc., is a nonprofit 501(c)(3) organization dedicated to protecting human health from environmental harms through research, education and the promotion of sound public policy. Environment and Human Health, Inc., is made up of doctors, public health professionals and policy experts committed to the reduction of environmental health risks to individuals" (EHHI Mission Statement). EHHI founds their policy initiatives on the research studies and reports they publish.

The title of my position with EHHI was "special programs intern." I spent the majority of my summer working on a new EHHI project dealing with pesticides used for lawn care. I did a lot of field work traveling to stores selling lawn care chemicals, collecting information, taking pictures, and interviewing store employees. Generally, most of my work was independent research that EHHI used in a press conference this summer and will use in an upcoming report on lawn care chemicals.

My learning objectives for my internship with EHHI were to learn as much as possible about the issues I worked on and to learn about how a nonprofit organization such as EHHI is run, organized, and what such an organization can accomplish. I learned much more than I expected about lawn care pesticides. I was more involved in field research than I anticipated and was given the opportunity to follow through on my own ideas. I learned how EHHI is organized and run as well as how they develop research ideas and then follow through on their initiatives through research and public consciousness raising. I was able to participate in a wide breadth of activities EHHI engages in which allowed me to understand more about the organization including how and what they accomplish. Another valuable aspect of my internship was the skills it developed in me. I gained confidence in my interactions with people in a wide range of settings from the floor of Home Depot and Lowe's to the office of the Attorney General of Connecticut.

The Precautionary Principle:
The precautionary principle states that when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. This principle has been used in a wide range of settings from international declarations to Massachusetts law to a convention of environmental thinkers. Yet, rarely has it been discussed philosophically. Professor Derek Turner and I decided to examine the precautionary principle from a philosophical standpoint. We had hoped to provide a philosophical defense for the principle, but after careful examination we came to the conclusion that the precautionary principle has several significant weaknesses. Thus, the paper that resulted from our summer research carefully explicated the numerous problems the precautionary principle faces. This paper, entitled "Reasonable Precautionism," has been submitted to *Environmental Values*, an environmental philosophy journal.

Professor Turner and I began our project by researching the literature on the precautionary principle. We both feel that the precautionary principle is intuitively correct, but the deeper we examined it, the more problems we found for it. Eventually we realized the only position we could defend was the position that while there seems to be something intuitively correct about the precautionary intuition, the precautionary principle is not a sound moral principle. This is the position we explicate in our paper.

Working with professor Turner was extremely valuable to me for all of the reasons I anticipated. Although I did not expect the precautionary principle to be such a difficult and at times frustrating topic, the fact that it was such a challenge enriched my experience. I worked through a difficult philosophical problem to an unexpected result. Having done this has given me confidence that I will be able to work through other difficult problems in the future. Working with professor Turner gave me the opportunity to experience how collaboration works in philosophy.

Senior Thesis: Future Generations and the Future Environment:
I am writing a thesis in environment ethics. The question I seek to answer is: How can environmental ethics deal with the issue of decisions involving the future? I will begin by examining philosophical literature on obligations to future generations before moving on to the less discussed topic of the future environment. I plan to explicate how the anthropocentrism/non-anthropocentrism divide extends to questions involving the future. I anticipate that my thesis will illuminate different moral stances regarding decisions that affect the future focusing my attention both on obligations to future generations and obligations to the future state of the environment.

The knowledge I gained working with EHHI about pesticides will provide me with an example of an activity that can affect both future generations and the future environment. I plan on using this example to create continuity throughout the different sections or chapters of my thesis. My understanding of the precautionary principle will also be integrated into my thesis. I intend to use the precautionary principle as an example of how difficult it is to formulate sound moral principles that deal with both the environment and humans, among other things. As a whole, my experience working with professor Turner on the precautionary principle will benefit my thesis in so far as it strengthened my talents as a philosopher. Thus, my CCBES internships will greatly contribute to the whole of my thesis in several forms.

Katie Jones
Appalachian Mountain Club, Boston, MA

The Appalachian Mountain Club (AMC), founded in 1876, is the oldest non-profit organization in America that brings together outdoor recreation, education, and conservation. By encouraging the enjoyment of the Northeast's rivers, mountains, and trails, the AMC is able to promote the protection and wise use of these areas as well. The AMC's central philosophy is that conservation efforts can only succeed if people feel connected to the natural world—the AMC encourages this connection by hosting educational workshops and outdoor recreation activities that aim to bring people into nature, and to help them understand why conservation is so important. Because of my academic interest in environmental education and my love of outdoor recreation, the AMC seemed the ideal organization to work for this past summer.

My initial internship learning objectives were primarily to gain experience working for a non-profit environmental organization in an urban area (Boston) so that I could understand more

about the important environmental work being done away from the field. I wanted to learn more about the AMC in terms of their mission and goals, and to experience firsthand some of the process that goes into achieving them. I wanted to learn more about the responsibilities outdoor educators face in terms of teaching about the environment, and to learn specifically about how the AMC combines outdoor leadership with environmental education. My hope was also to work with AMC volunteers (the backbone of the organization) while conducting primary research in the field of wilderness ethics in order to strengthen my communication and researching skills.

I was able to meet my goals by working primarily on two different projects. For the first part of the internship, I assisted the Volunteer Programs Assistant and the Outdoor Leadership Coordinator with the preparation for and ultimately the execution of Mountain Leadership School (MLS), a weeklong outdoor leadership-training program held at Pinkham Notch in the White Mountains. The preparation included assembling educational materials, meeting with the director of the program several times to review the course content and to make minor adjustments, organizing the group gear for 55 participants and 16 instructors (compiling first aid kits, checking tents, etc.), and screening the participant applications so that eight smaller groups could be created based on age, experience, and physical fitness.

During the week of MLS, I was given the opportunity to stay at Pinkham's base camp lodge in order to continue with the assistance of the program. Each day I hiked with one or two of the other members of the support staff team to catch up with one or two of our groups and check in with them. I was also given the responsibility of MLS photographer—the AMC hoped to use my photos for various AMC and MLS publicity publications. I hiked each day with three different cameras (manual, automatic, and digital) and got to know the instructors, participants, and other support staff members well throughout the week. At the program's graduation event, I distributed information and talked about trail stewardship—a "giving back" element of the program that I felt had been missing. When I returned to Boston after the program, I spent a week processing the participant evaluations, and categorizing my approximately 200 photos.

The next project I worked on was the focus of my internship work. My job was to initiate and complete the beginning stages of a major revision of the AMC's Outdoor Leader Manual. I learned about project management by discussing the project, including specific goals and a timeline, with Katherine Byers, the Outdoor Leadership Coordinator and my immediate supervisor. At the beginning of my internship, almost every AMC chapter (the AMC's membership of over 90,000 individuals is broken down into 12 geographically-based chapters from Washington, D.C up to Maine) had their own chapter leadership manual. My job was to review all of these existing manuals, and to distinguish the well-written material from the material that was poorly written and/or inaccurate. I talked and corresponded with individuals from each of the 12 chapters about the manual revision project (I ultimately spoke with about 30 people), and assessed each individual's overall interest level in helping with the project. I also was responsible for editing various chapters of the current AMC Outdoor Leader Manual, and to review and edit the new material submitted by volunteers.

When I noticed that there was no chapter in the manual that focused on backcountry ethics and minimal impact camping and travel skills, Katherine and I determined that after researching materials on general backcountry ethics including the *Leave No Trace* principles, I would be

prepared to write a new chapter about this important topic. *Leave No Trace* (LNT) is both a non-profit organization and a set of seven principles that have become the standard backcountry ethic. During my research I completed a LNT training course and became a certified LNT Trainer. By the end of the internship, I had written and co-edited a new chapter for the AMC Outdoor Leader Manual entitled "*AMC Backcountry Ethics and Minimal Impact Skills*."

My initial internship objectives were met and exceeded, especially in the communication and research skills I developed. I learned how to work effectively on my own, as part of a team, and with volunteers. I also learned more about certain volunteer/staff challenges, and how to effectively manage this delicate relationship. This internship was invaluable both in terms of preparing me for my senior independent project (SIP), and in terms of preparing me for full-time work in the non-profit environmental workforce.

For my SIP, I will examine the established wilderness ethic of *Leave No Trace*. I want to discover whether its origins are anthropocentric or non-anthropocentric, and then defend wilderness experiences by explaining *how* they should be carried out in accordance with the LNT ethic. In terms of preparation for my SIP, I was able to both write and issue a questionnaire/survey about LNT and distribute it to MLS participants and instructors ranging in age from 18-64. The results from this survey gave me much insight into how diverse outdoor recreators think about the environment, and how they practice the LNT ethic. I plan to use these survey results as a primary research component of my SIP. I was also exposed during my internship to many articles and books that I will be able to use for further research, and I plan to organize and use the photographs I took as a visual slideshow illustrating how LNT is practiced in the backcountry.

Lindsey Kravitz
Mystic Aquarium, Mystic, CT

As the education intern at the Mystic Aquarium I was exposed to the beauty of teaching and the overall inspirational atmosphere of learning. Mystic Aquarium, Connecticut's largest aquarium, has a mission to educate and move people about the marine environments. It is a holistic environment that simulates all aspects of marine ecology and biology. Mystic Aquarium is a non-profit organization and is run by the numerous volunteer staff. The aquarium has a very structured internship program, where only one student is chosen for every division. Interns are given the responsibility to design a research project and are expected to spend 50% of their time independently on this project; I had the opportunity to be the summer's education intern.

A division of the aquarium's education department is Public Programs, where the staff reaches out to the public for promoting public awareness and knowledge. The education intern does not typically work for this sector, but this summer was unusual as the department was understaffed. The addition of the new swamp exhibit increased the need to actively involve the public. This was my mission at the beginning of the summer; I was to give life to the new exhibits.

My personal goal was to combine didactic, formal education with up-beat and exciting science exploration. Somewhere there is a crossover between content-based learning and inquiry

learning. I was intent on developing content-based classes that were entertaining, and free of cost, to enhance environmental learning; from this goal I created three public programs on swamp ecosystems. Research led to ideas, which led to the creation of the lesson plans. The three classes I designed were on alligator adaptations, crocodiles and alligators, and swamp biodiversity. I made all of the classroom materials, mainly felt pieces and large, colorful pictures that could be stuck on the felt boards. By July the classes were ready, my nerves began to settle and I began to teach. I taught up to five classes a day and from the very first moment I was confronted with challenges.

The public programs at the aquarium were taught on the main floor, which was crammed with summer travelers and large summer camp groups. I quickly learned how to teach most effectively in this uncontrolled setting: to be completely animated. The classes turned into a game, complete with loud frog noises and hopping around on the floor and snapping our big "alligator" jaws. I had the children close their eyes as they imagined paddling through a dark swamp. I asked them: What are the noises you hear? Does anyone smell anything different? The classes always ended with Daisy, the American Alligator. I would have the children be very quiet, putting their finger to their lips, as I reached slowly into the large cooler and brought out a three foot long Alligator. The main floor echoed with sounds of amazement as the kids felt her scaly tail and five webbed toes. It was through the movement, the gasps, and the imaginary adventures that I was able to teach effectively. It was only after slithering like a snake, and imagining underwater alligator eyes, that the kids could understand the content. The class suddenly became more than felt pieces and glossy photographs; it became real and tangible, as they slipped into the imaginary world that only a child truly knows.

It was during these programs that I learned more about the ability to engage a child, and to truly educate. Expecting to be the teacher, I taught myself in the process. Along with the program work, I also taught marine biology classes in a formal classroom setting. I experienced both areas of teaching, but it was only when it was an exciting adventure and the class became ocean explorers, that I felt I had truly educated a child.

My passion for teaching and engaging children in science led me to my thesis topic: environmental education in different cultures. Using the UK and Poland as case studies, I will examine the uses of environmental education, and the teaching of environmental ethics. A successful environmental education program, as is seen currently in the UK, contains valid content in curricula, coupled with the challenge of teaching an appreciation for nature. The summer classes at the aquarium are a small piece of a large puzzle. It is through the combination of outdoor adventures and structured curricula that environmental ethics form, and it is in this informal, inquiry-based forum that excitement for science emerges.

Sarah Lathrop
Littlewood Farm, Plainfield, VT

I spent this summer interning at a small organic farm in Plainfield Vermont. Littlewood Farm is approximately thirty acres including a dozen cultivated acres of land flanked by a meandering river. Joey Klein, owner of the farm, runs Littlewood with the help of various friends, part-time employees and a few interns. He uses four tractors and a small roto-tiller, but mostly does the

work by hand. The farm encompasses three types of soil: well-drained sandy soil, denser silt and moisture-retaining clay. The fields lay in four sectors: three benches on different elevations of the same hill and a fourth beyond these on an outlying piece of land, shaped by the wandering river.

The summer began with my arrival at this scenic and quaint patch of cultivation nestled in the Winooski River Valley. I found myself living in dusty and rustic accommodations that were heated by an inefficient woodstove and outfitted with an accompanying outhouse. I began working in the greenhouse seeding 98-cell flats and selling plants to customers who had made the pilgrimage to the small but locally favored farm and by planting the future crops, such as tomatoes and peppers in the greenhouse and lettuce and kale in the fields. I soon learned names of plant families, such as cucurbits (gourds, melons, summer squash, cucumbers) and brassicas (broccoli, Brussel sprouts, cauliflower, kale, cabbage) as well as information describing the many plant varieties I sold to customers, such as the differences between determinant and indeterminant tomato varieties. In addition to these tasks, I aided in the harvesting and delivery of crops, mostly lettuces, mustard greens (mostly mizuna) and kale to local restaurants and food co-ops. Weeds began to flourish along with the growth of plants we had set into cultivated and fertilized beds. I came to appreciate the true meaning of the phrase “I’ve got a long row to hoe.”

Two other interns joined me in the month of July and their arrival marked the beginning of strawberry season. This entailed hours of picking every morning in order to fulfill orders from our bulk customers as well as manning and supervising a pick-your-own operation. This point in time also represented a peak in weeding, planting, seeding and cultivating duties. One of the most detailed, time-consuming and delicate assignments on the farm fell into my hands and soon became one in which I took great pride and delight: I found myself responsible for training the tomatoes. I had already dug the holes and then fertilized, planted, strung up and frequently watered these plants with a ghastly-scented diluted mixture of seaweed, fish emulsion and Epsom salts. In order to properly complete the charge of tomato training, I learned to recognize “suckers”: shoots which, if left to grow, would sap the plants’ strength and create plants of an impractically unruly structure. Once I spotted these shoots I would pinch or slice them from the main stem of the tomato, discard them and twine the plant or clip it to the string I had hung to support the ascending tomato vine. Also around this time three hundred mail order chicks arrived, a mixture of future laying hens and meat birds. The other interns and I helped to raise these chicks for one month and then boxed and delivered all but twenty-five of the month-old chickens to Joe’s friend and fellow farmer.

By August we had nearly arrested the weed situation and brought it under control. We cover-cropped some of the spent fields that had nurtured early crops and I learned to disc-harrow a field with the largest and newest tractor on the farm, simply dubbed “The 165” because of its model number. I also shared in the task of spraying; an organic farmer uses diluted, easily biodegradable natural agents in order to combat pest infestation. Spraying must be done in a waterproof full-body suit while wearing goggles and a breathing mask, carrying a tank of liquid upon one’s back. The spraying is done with a wand pressurized by a hand pumping mechanism; it is a hot and taxing, but necessary, job.

August also represented a flux of summer ripeness. The focus of our weeks became the Tuesday and Friday deliveries as well as the Thursday and Friday farmer's markets. For these events we harvested a wide variety of crops including: lettuce, kale, tomatoes, peppers, eggplants, string beans, garlic, cucumbers, beets, carrots, potatoes, onions, Swiss chard, basil, parsley, tomatillos, daikon radishes, cabbages, zucchini and summer squash. Also in August the interns had the responsibility of manning the farm by ourselves during the Klein family vacation. This week happened to be one of the hottest and driest of the summer and we became very familiar with the task of hauling and linking thirty-foot lengths of hose and three-inch pipe up and down the hilly farm in order to irrigate. The irrigation pump draws from the river and runs with the transferred power of the 165's engine, while the stationary tractor is connected to the primed pump. This creates up to seventy pounds of water pressure; just enough to send the water surging forth uphill through the hoses and pipes to the "rain gun" in the field, which then covers a circular swath of cultivated land in artificial rain.

Combating the elements by hand, using the most innocuous methods out of respect for the environment, caring for, lovingly harvesting and proudly distributing the literal fruits of one's labor are all wonderful and satisfying pursuits of the organic farmer. This internship has been an extremely worthwhile, enjoyable and didactic experience. It has forced me to think about where food comes from, how it is cared for, who harvests it and by what method, and what characterizes the lives of the farmers and the plants that produce it. I recognize more vividly than ever the hazards of modern, chemically laden techniques of factory farming to the consumer and to the Earth. I have become more intimately connected to my environment and have garnered a deeper respect for Nature. I have tasted the sweet results of environmentally responsible organic farming methods, observed its positive impact on the community and I rue the detrimental practices of modern farming that overpopulation has forced into practice. This experience has readied me to begin studying the relationship between people and plants, as expressed in poetry, for my senior project.

Molly Lippman
Roughing It Day Camp, Orinda, CA

For the past fourteen summers of my life, I've gone to summer camp. This past summer was no exception, but that is where the comparison ends. Far removed from the residential summer camp in the Connecticut woods at which I grew up and acquired my love for nature, I spent the summer of 2002 in California's Bay Area working for Roughing It Day Camp. Established in 1972, Roughing It celebrated its thirtieth anniversary this summer; it holds a reputation as a distinguished day camp program, offering a wide variety of traditional camp activities in an all-outdoor setting. Particular emphasis is put on the creation of a child-centered environment in which respect and caring are nurtured. Through the leadership of Group Counselors and Program Staff, it is the camp's goal that children have fun while building self-confidence, character, a sense of responsibility, self-reliance, and an understanding of others and the world around them.

My job as a Group Counselor at Roughing It drew upon my previous experience in working with children, allowed me to combine my interests in Human Development, Elementary Education,

and Environmental Studies, and also challenged me in ways that I had not anticipated. Though it is the responsibility of all counselors to supervise and lead all of the campers, boys and girls ages five through fifteen, I was specifically responsible for a group of sixth and seventh grade girls. The eight weeks of camp are broken into two four-week sessions, which turned out to be quite different in terms of the make-up and dynamics of my camper group. Session One matched me with thirteen outgoing, vocal, and ultimately respectful campers; they valued me as a role model and authority figure, and I was able to leave many group decisions up to their capability as a democratic entity. As their counselor, I was able to accomplish several of my learning objectives, namely providing positive leadership and getting a better idea of the impact of the social summer camp environment on campers.

Session Two was a group of only six girls, most of whom were much more difficult to work with than those in the first four weeks, in terms of creating a caring, close-knit group. Working with the children through discipline problems, issues of respect for both authority and for peers, and a general lack of motivation towards any real sense of unity, challenged me to become a more thoughtful leader, a more creative disciplinarian, and a much more observant person. Coming into the summer, I had felt that because I already possessed most of the traits that were necessary for being a successful counselor, I would have an easy job and would be able to focus most of my efforts on my research involving children and the environment. Though Session One led me to uphold that belief, Session Two reminded me that children are unpredictable, and that I am a lifelong learner – that is, I will never acquire a complete knowledge of children or of myself. Though my six campers challenged me in so many unexpected ways, an additional and positive surprise was that individually, they all had a lot to teach me about how children value the outdoor world. During our group's scheduled time at Environmental Education (one of the camp's activities), the children were generally well behaved, inquisitive, and thoughtful. Thus, my experience during Session Two added much value not only to my own learning, but also to my preparation for my independent study this year.

While at camp this summer, I maintained close communication with the Environmental Education Counselor, as well as with the administration and the rest of the Group Counselors. With the cooperation of all, I was able to survey children on their attitudes, beliefs, and actions towards the natural environment. About seventy children, between the ages of eight and thirteen, filled out the Children's Attitudes Toward the Environment survey, a scale developed by Musser and Malkus (1994). The campers completed the survey during both the first and last week of the four-week session, so as to provide results that could later be compared using statistical analysis. The camper groups filled out the survey as part of their regularly scheduled environment activity period; this provided them with a context in which to discuss some of the issues on the survey after completing it. I believe this factor to be one of the most positive pieces of my project; some meaningful conversations took place in relation to the survey questions, and it is my hope that some of the children continued to think about the issues after they left camp. It is one thing to consider questions concerning the environment while sitting under a canopy of pines, but to take these things home is the real goal of the environment program. It is a goal of my project to investigate whether or not this process actually occurs. To supplement the quantitative data supplied by the camper surveys, I will be using qualitative information supplied by parents in a post-camp survey. Parents have been very honest in answering my questions regarding their children and their experience with the environment this summer.

In addition to the qualitative data provided by camper parents, I collected notes of my own; I spoke with my own camper group about issues related to the environment, and observed others in their interactions with fellow campers and with the outdoor space where camp was held. I also asked for input from fellow staff members as to children's camp experience, particularly in terms of campers' relationship with the natural environment. It is my hope that the information I gathered, both qualitative and quantitative results, combined with additional literature reviews to be completed as part of my independent study, will allow me to write a paper that acts as a lens through which to view children and the attitudes they hold toward the environment. Included among these outlooks will be beliefs that were held before coming to camp (and perhaps strengthened or weakened depending on the individual's camp experience), as well as beliefs that are formed as a result of the dynamic physical, social and emotional environment at summer camp. So much of the research in the field of Environmental Education focuses on specific Environmental Education programs at work in schools and communities. In employing a case study of Roughing It Day Camp, I hope to shed some light upon the actual inner-workings which factor into both the experience that children have at a general summer camp program, and the attitudes and behaviors, which result from that experience.

Vetri Nathan
The "Kids for Tigers" Program, Bombay, India

From traveling for kilometers (not miles!) on the Great Indian railway, to working up an enthusiastic group of motivated high school teachers in huge metropolitan cities such as Chennai and Bangalore, to heading to the great sanctuaries (protected national parks) in central India - I can say that there was never a dull moment during my internship with the *Kids for Tigers (KFT)* program.

In a nation that ranks among the tops in the world in terms of ecological wealth, there was much to be lost in too quick a time. Most NGOs seemed to have an inconsistent and half-hearted take on public awareness. There was a dearth of idealism, initiative and optimism. The *KFT* Program was launched in 2001 and the scope was to bring about large-scale awareness in the major cities of India. The team, under the auspices of *Project Tiger* (the highly successful tiger conservation project launched by Indira Gandhi in the 70s) decided that there needed to be a massive educational movement directed towards children, that brought together many environmentalists, educators and the public in the race to save much of India's biodiversity.

The Royal Bengal Tiger, traditionally called the "Striped Water God" by many indigenous peoples, is a symbol of the overall environmental health of the country and *KFT's* aim is to bring school children mainly in grades 3 to 8 closer to the understanding that the tiger is a representation of their own well-being. The program's aims are not humble precisely because its initiators do not think they can afford to undershoot their agenda at this crucial stage in India's steady march into environmental degradation. It hopes to create a large-scale realization of how individual lifestyle choices and active political lobbying can affect the forests and water resources of the country. My work involved making phone calls to heads of schools, to preparing

educational materials to actually speaking to children about tigers. The program reaches 12 cities in India and my first job was to travel to some of the cities and meet the heads of schools and encourage them to join the program. Much of my time was spent in the south of the country. For example, in warm and sultry Chennai, I visited at least 50 different schools. The first stage of the program was a teachers' workshop where representative teachers were brought together to discuss the yearlong program. Organization of this workshop, along with the help of the city-coordinator was my responsibility.

After this round of travel, I stuck to the city of Bombay, where I was traveling to schools everyday to give slide presentations. The slide show was called "Understanding Wild Tigers". "*Jungal nadi ki maa hain*" (the forest is the mother of the river) was a small but important lesson I hoped to communicate. How do you make a ten year old understand the importance of the tiger-forest-water connection? Noel De Sa, my project coordinator, had fascinating ideas. He had a talent in stoking up the imagination and bringing in the wonder of the wild into the child's mind. I learnt a lot from his energy, ideas and imagination. I also helped in the creation of a CD-ROM on tigers to be used as a resource by children, as well as a Teacher's Book that presented some ideas to teachers of all subjects – be it English or Math – on how to bring in the ideas of environmental conservation and incorporate them in their day-to-day lectures.

Working for *KFT* was a very gratifying experience. I came to interact with the young and restless environmentalists of the new generation who felt an urgent need to take matters into their own hands instead of leaving the government to proceed with their defunct and achingly inefficient environmental programs. The rewards made up for the hard days in many more ways than one – the look of awe in the children's eyes as we talked about wild tiger antics and the clever questions they came up with at every moment made my efforts well worth it. Many teachers at the workshops would come up with brilliant ideas about concrete efforts the schools could make to curb waste – many city schools have decided to come up with collective initiatives to save electricity and water or dissuade use of plastic. I was able to travel to sanctuaries and help in an ongoing tiger census project as well – a most exciting experience. Talking to villagers and local people that lived in the fringe areas of National parks was an eye-opener to the complex issues facing both policy makers and local interest groups.

For my senior integrative project, I hope to work on an independent study that assesses the contemporary cultural and political norms in India that lay light upon the larger picture of the environmental situation in the country. While interning with *Kids for Tigers*, the difficult issues that revolve around India's future environmental choices came to life around me in many startling and moving encounters with both Man and Beast. Both urban and rural India is facing the problems slowly, but my time with *KFT* brought the words 'hope' and 'commitment' to the forefront of my thoughts. Hopefully, my independent study will be my way of cataloguing as well as meditating upon the complex interplay between the social, political and environmental spheres of the country that I have been lucky to experience.

Kassie Rohrbach
The Center for Resource Solutions, San Francisco, CA

This summer, I interned at The Center for Resource Solutions, based in San Francisco, California. The Center for Resource Solutions (CRS) brings together diverse interests to

implement practical resource solutions. Their national and international programs promote clean and efficient energy use, encourage sustainable economic growth, and help preserve the environment for present and future generations. Domestically, their programs include Green-E and Green Pricing Accreditation both of which ensure the consumer that the renewable electricity they are purchasing is truly being generated from renewable sources. As a non-profit organization, their accreditation is a non-biased, reliable service for the consumer. They also work with distributors and marketers of renewable energy products in a program called The Marketers Marketers Group (MMG), which provides a platform for insider tips and current market information to be shared among the industry. This serves to build the renewable energy industry.

The programs I worked on this summer included Green Pricing Accreditation and The Marketers Marketers Group. Much of my work with these programs began with in-depth, hands-on instruction of each program, current overall national market status, and the future development of both. I then helped to draft a report on the potential of Green Pricing Programs in Utah and Nebraska. This involved extensive research on the potential renewable resources in the state, such as wind, solar, and geothermal. In addition, I researched the current green pricing programs and renewable energy plants that already exist in each state. When it is completed, the report will be read by the WAPA, Western Area Power Authorities, who will use the information to begin to develop renewable energy further in Utah and Nebraska. In addition to the document for WAPA, I did research for a paper on the current Green Pricing Programs around the country. This work involved selecting five programs that would give a strong overall picture of the types of programs that are succeeding across the country. I then interviewed the manager in charge of each program. I also helped to create a general survey for all of the green pricing programs around the country (about 60), which gave us a broad view of current industry. Both research projects gave me comprehensive knowledge on the current state of renewable energy as an active market.

Working on the Marketer Marketers Group furthered this knowledge. My first project within the MMG was to create a library of various materials (advertisements, information packets, brochures) that have been used by the different businesses marketing green power across the country. This work was enjoyable because it clearly showed me the importance and power of how one markets a product. From good examples to bad ones, the library acts as a useful resource for interested members of the MMG. I also helped to facilitate and takes minutes for the monthly MMG conference calls. These were always exciting because marketers would share success stories; it also allowed me to see the diversity of people that are interested in making renewable energy a viable market. I then helped my supervisor create a comprehensive survey on the current status of renewable energy. This survey will be used for a presentation that will be given at the 7th Annual Green Power Marketing Conference this October in Washington, DC. I enjoyed this work because it allowed me to be creative and generate questions that I felt were important to ask.

In preparation for my senior integrative project, I spent time researching CRS's international programs. I focused on an energy efficient oven project in Chiapas, Mexico. The Center allowed me access to all internal documents, proposals, and evaluations on the project. I also did an extensive interview with the director of CRS, Jan Hamrin. For my thesis, I will research how

energy development, specifically renewable energy development, affects women's lives in the Third World. The energy efficient oven project done by the Center is a good example of this, because it is energy development that directly affects the daily life and culture of the women in the villages involved. Imposing technology onto another culture brings up issues of patriarchy and colonialism. I am interested in looking at how new technologies are gendered. How do they change women's daily roles, family responsibilities, and cultural values. I also want to investigate the degree to which it is possible to share ideas and new technology between cultures without imposing a hierarchical relationship and creating dependency. The two topics, energy development and women in the Third World, bring to light the interconnections between patriarchy, colonialism, economics, environmental ethics and sustainability.

Overall, I feel that my original objectives were met. From my internship, I gained a strong understanding of the renewable energy market in the United States. In addition, I was able to network with people and businesses in the industry, which may assist me in my future endeavors. My internship was very valuable, not only to my research for my thesis, but also for the experience I gained in a professional non-profit environment.

Daisy Small
Bolleswood Natural Area at Connecticut College, New London, CT

Measuring trees, counting stems, swiping spider webs away, picking off deer ticks and watching out for poison ivy, the life of a field botanist-in-training is exciting and dangerous. Other people don't understand the true nature of the job, especially when they ask, "do you get paid by the tree?" I do not amble around the woods in pink shirts and Birkenstocks all day, picking flowers and looking at the sky. Really. There is much more to it. It requires patience, diligence, an eye for detail and a good memory. The ability to work in inclement weather, immunity to DEET and the wish to die young of falling off cliffs, West Nile virus, and Lyme disease are imperative. I should have been paid more.

I worked as a field worker and crew leader under the supervision of Dr. Christine Small (great boss and advisor). I worked with four other students who were wonderfully funny, enthusiastic, smart and hard working (never mind the Dunkin Donuts breaks). I spent the summer studying the plant communities of three forests in central Connecticut. The first study was a continuation of a study established in 1952 by Dr. William Niering and Dr. Richard Goodwin, which records the long-term vegetation change of the Bolleswood Natural Area (BNA) at Connecticut College. This took up most of our time. I was responsible with my co-crew leader Marjorie for organization: getting people up and moving, making sure we had everything we would need, looking ahead for anything we could ever *possibly* need, and delegating responsibility to some extent. The BNA study is based on permanent transects (long lines) twenty feet wide marked by pipes and drill marks every fifty feet. Every ten years since 1952, these plots have been resampled. I got to go out ahead and search for these elusive pipes and marks. I often imagined myself bushwhacking through the Amazon on a hunt for buried treasure. I learned a lot about using compasses this summer.

So we would fill up our packs, grab our lunches, chaining pins, tapes, clipboards, reference books, multi-colored flagging and past data, and walk out to the BNA every day. Once there, we measured trees, estimated percent cover by species and generally recorded everything in 890 10ft x 10ft plots. All of us learned the Latin and common names, habits and growth forms of a couple hundred plant species. It was work that should have become tedious after the first week, but it didn't. Throughout the summer, the work remained interesting as we entered new and different plant communities. The boring part came when we had to enter all of the data into five separate spreadsheets.

The work in the BNA was broken up by trips to our second study site. The Burnham Brook Preserve has a problem, like the rest of Connecticut, with deer selectively nibbling away the under story vegetation. We worked with The Nature Conservancy to construct four deer exclosures and permanent plots that we then surveyed, initiating a study to quantify the impact of deer browse on forest plant communities. Many of the techniques used were similar to those used in the BNA, but the setting was very different. We found it interesting that two forests should be so close geographically and yet so different in composition.

Halfway through the summer we worked on our third project studying the pitch pine (*Pinus rigida*) sand plain community at the Hopeville State Park Natural Area Preserve. These communities are fire dependent. Pitch pines require the heat of fire to open their cones and release their seeds, and mineral soil burned free of organic matter in which to germinate. These communities are now regionally rare, due in part to past and present policies of forest fire supression. The community at Hopeville has been without significant fire for many decades, allowing the more opportunistic and fire sensitive white pine, *Pinus strobus,* to become dominant in the forest. In an attempt to restore the pitch pines and plain community, the Connecticut Department of Environmental Protection (CONNDEP) has instituted an experimental program of prescribed burns. A fire trail was cut through the pitch pine forest. On one side, an unburned control area was set up; on the other, an area to be burned was designated. Permanent transects and plots were set up on each side and sampled prior to the fire. Then DEP firefighters came and used drip torches to start a controlled burn, designed, in part, to kill off a great number of the white pines. Hopefully, another prescribed burn will be done next year in the same area. After the fire, we camped out for a week at Hopeville State Park, sampled the unburned control section, and resampled the burned section. Another new technique I learned was tree-coring. A long, hollow, metal drill bit is twisted into the trunk of a tree at breast height, and then pulled out, extracting a core from the tree. Counting and examining the annual growth rings can date the tree and also give a history of drought and fire in the area.

I believe all of my internship goals were met. I have become well acquainted with botanical fieldwork, learned a lot of new plants, and a bit about forest ecology, and worked to add to a database, which I can use for my senior honors thesis. I will write an honors thesis on forest succession, studying the changes in the Bolleswood Natural Area at Connecticut College, now that the wooly adelgid (*Adelges tsugae)* has almost exterminated the eastern hemlock (*Tsuga Canadensis)*. The wooly adelgid is an exotic insect that lays its eggs on the underside of hemlock twigs. The young hatch, stick their proboscis into the tree stem, and suck the nutrients out of the trees. The wooly adelgid spreads rapidly and has now invaded parts of Pennsylvania, New York, Connecticut, and lower Massachusetts. In areas it has invaded, the hemlock stands have been

almost completely decimated, changing the composition of the plant and animal communities. What is replacing the hemlock in the forest community? How are the canopy and understory reacting? What will our forests look like in thirty years? These are questions I will attempt to answer. After the chesnut blight came through the east, our forests were radically changed forever. We are now looking at a similar situation with the eastern hemlock and the wooly adelgid.

John Traversi
The New England Aquarium, Boston, MA

This summer I was a marine mammal husbandry intern at the New England Aquarium. This was my second year of interning at the Aquarium, but this year was much more involved and it was a much larger time commitment. Because this was my second year at the Aquarium, I was given more responsibility and more privileges. Because of the experience garnered the previous year, I was allowed to travel to Cape Cod and play a major part in the rescue effort of 55-beached pilot whales. I was also allowed to work independently on most projects and was able to get involved in a cutting edge research project.

Oddly enough, being a marine mammal husbandry intern, most of my work and research dealt with turtles. My “busy work” such as cleaning, food preparation, and husbandry was with the mammals. I was involved in two separate training experiments. One involving a 600 pound green sea turtle named Myrtle and the other involving three loggerhead hatchlings. The project with the green sea turtle uses operant conditioning training to determine the range of green sea turtle hearing. Its ultimate goal is to use this information to improve the lives of these turtles in the wild. For example, to construct a dolphin pinger-like apparatus (pingers emit a certain sound irritable to dolphins to repel them away from areas or objects) that could be placed on boats or oceanography equipment to deter the turtles away from dangerous areas. The Myrtle Project is cutting edge research because not much is known about green sea turtle hearing and this type of testing has never been done before. This project demanded the bulk of my time because I was the animal’s primary trainer. I was in charge of setting up the equipment, running the experiment, breaking down the equipment, and of course, answering the hundreds of questions (usually the same five) from the crowd about what I was doing.

The loggerhead hatchling study was a basic target training study where we were training the turtles to touch a PVC pipe target when it was feeding time. The purpose of this ongoing experiment is to improve the feeding process in an exhibit setting. Before the hatchlings were trained, they would often get violent with each other and bite during feeding time. These little guys were so much fun to work with; their heads and flippers were too big for their bodies and their attempts at biting me were hilarious.

The experience I received training turtles was unique and extremely interesting. It interests me so much that I feel I want to do it independently for my senior project. I will train three red slider turtles in a similar fashion as the green turtle I worked with this summer. The experimental design will be similar to the Myrtle project but with some modifications. The goal will be the

same – to better understand the hearing of the red slider turtle through operant conditioning. When I proposed my project before the summer, this was absolutely the last thing I thought I was going to do. My ideas of my project were vague, but knowing what I know now, I feel confident that I can achieve my goals.

All in all, this summer was amazing. Aside from the aquarium, I spent a lot of time biking and playing drums in a rock and roll band with my friends. Boston is such a great city with so much to offer both in marine biology and in general…I can definitely see myself there after graduation. Maybe back at the Aquarium…who knows.