Time of death: 13:25, February 21, 2007. The squeaky wheels of a dolly carry Ark, one of a declining population of California sea lions to the Marine Mammal Center's Necropsy Lab. Dr. Nutter inserts her practiced, gloved hand into Ark's body, leaving room for my shaking, untried hand to reach in and tentatively cut out samples of Ark's muscle to send for analysis. I was 16 years old, and this was my defining moment, the one I will remember forever, when marine science transformed from a hobby to my chosen vocation.

This necropsy is just one example of the unique opportunities I had growing up that supported my development as young scientist. With my close proximity to the ocean, I became passionate about marine biology at an early age. As a junior in high school, this yearning prompted me to conduct a school-wide survey of potential interest in more specialized science courses. To my surprise and excitement, Marine Biology was the most popular choice. As a result of my efforts, I was invited to assist in the design of the course's curriculum, including the selection of the textbook and classroom materials. Six months later, the school board unanimously approved the new science elective. The success of developing this course for future scientists, and the support I had throughout the process, fueled my passion and conviction to pursue similar types of projects, which would facilitate opportunities for other scientists and reach out to the community. The NSF fellowship will help me promote opportunities such as this to underserved groups within the community in which I pursue my graduate degree.

My high school marine biology course gave me an appreciation for the complexity of the marine world and this awareness continued to grow as I studied at the University of California, Santa Cruz (UCSC). Understanding the complex nature of the ocean requires an interdisciplinary approach; with that in mind, I approached all of my coursework by framing it in the context of how it might apply to the ocean and the organisms, systems, and processes that occur there. I gained hands-on experience with experimental design, implementation, and presentation of results during ecological field courses taught in both the Monterey Bay and Mediterranean Sea. These experiences were foundational to the mapping project I developed after graduating (described below). In addition to my coursework, I engaged in multiple marine science research activities, including marine mammal physiology, impacts of invasive species, geospatial mapping, and microchemistry of otoliths (i.e. fish ear bones).

UCSC's intensive AAUS scientific diving course generated additional opportunities to address scientific questions and experience the marine system. The skills and techniques I have acquired as a scientific diver have helped shape me into an efficient and detail oriented researcher. The qualities instilled in an AAUS diver are applicable across disciplines and will continue to be useful as I pursue my future goals.

I first applied my skills as a researcher and AAUS scientific diver in my 2012 Kelp Forest Ecology field course. While diving in Hopkins Marine Life Reserve (HMLR), a fellow student and I noticed patterns in the patchy distribution of the vibrant pink anemone, an encrusting invertebrate of the temperate rocky reefs. We were curious about the drivers of this zonation pattern, and thus hypothesized that the mechanism driving the vertical zonation pattern of *C. californica* was post-settlement mortality, as opposed to the alternative mechanism: depth-dependent settlement of larvae. We used SCUBA surveys to determine the anemone's spatial distribution with respect to substrate height. With assistance from our professor, we used statistical software (SYSTAT) to analyze our data set. Our scientific paper and multimedia presentation provided our peers and professors with a fundamental understanding of our experimental design and the implications of our results.

I gained additional independent research experience in an international setting through a UCSC field course in Corsica, France. My study partner and I studied the distributions and habitat associations of two dominant urchins in the sea grass system of the Mediterranean. Geospatial data were used to generate a detailed habitat map of the study site. Extra field time enabled expansion of the habitat map to areas covering the class' entire study site. We used surface mapping software (SURFER) and statistical software (SYSTAT) to analyze our data set. We then co-wrote a scientific paper demonstrating the importance of spatially explicit, in-depth approaches to addressing questions of habitat and community interactions and their impacts on ecosystem dynamics. We presented our findings at the Western Society of Naturalist conference in November 2013. While our findings on the urchin distributions and habitat associations were novel to the study site, our results had the greatest impact through the development of a spatially explicit baseline of basic habitat information for the entire study site that is used in current and future field courses and studies. Distribution, size, and orientation data (for an endangered endemic mussel that can grow up to almost 4ft long) from our map is currently being compared to data collected earlier this year.

After graduating from UCSC, I developed an independent research project that looked into abiotic factors and community structure in marine reserves. This collaborative project resulted in spatially explicit habitat maps of the subtidal rocky reefs in two of Central California's marine reserves. These reserves, managed by Stanford University and the University of California Natural Reserve System, promote conservation, function as teaching tools, and facilitate research opportunities. The remoteness of the survey site in Big Sur, California required that I take a unique approach to coordinating the transportation, room and board of my team. I selected a strong, diverse team of divers (affiliated with UCSC, Stanford, Monterey Bay Aquarium, and NOAA) who could manage the challenges of combined camping and diving. An on-boat demonstration provided site-specific safety training, and I developed a rigorous training program for the divers, which instilled confidence in the collected data. I used MATLAB software to create 3-dimensional representations of the spatially explicit habitat data and collaborated with a graduate student at Stanford and a researcher with The Nature Conservancy to layer species abundance and distributions with the habitat data. Geospatial sea star data from my study was incorporated into a coast-wide effort to track the spread of the 2013 sea star wasting syndrome (seastarwasting.org).

At the culmination of this project, I submitted a final report comprising the datasets and maps, which is currently being used for enhancement of university ecology and dive training programs, development of future studies, and archival purposes. Additionally, I presented a poster of my newly generated maps at the 2014 Monterey Sanctuary's Currents Symposium. The poster was an excellent medium for sharing our results as the multi-layered maps included light exposure, temperature, relative water velocity exposure, and topographic features, as well as the size and distribution of over 85 species of algae, invertebrates, fish, and the substrate. An unexpected benefit of this mapping project was the opportunity for me to lead and mentor undergraduates and recent graduates. Upon completion of the project, I was asked to create a presentation for the UCSC scientific diving course to show students how to design and implement their own project, even when there is no apparent funding or support available.

Throughout the time I was conducting these independent research projects, I also worked on an annual NOAA research cruise, which conducted fisheries-independent surveys to provide indices of abundance for groundfish stock assessments. In addition to the standard mid-water trawls, I conducted bongo trawls, sorted and identified krill species and gravid females to map

the distribution and abundance of Pacific krill species. The following year, the head researcher tapped into my previous experience and placed me in charge of all of the bongo tows and specimen collection for a coast-wide stable isotope study. This experience provided me with access to researchers from the multiplicity of organizations that collaborate to make these cruises successful - the University of California, California State Universities, the University of Oregon, Stanford, Farallon Institute, and the Pacific States Marine Fisheries Commission. Networking with these researchers led to the creation and development of my current position with NOAA, in which I measure juvenile lingcod growth rates and conduct aging analyses. My findings will be essential for stock assessment modelers to better understand the dynamics of fish stocks and responses to environmental stresses. Ultimately, these data will provide long-term benefits to fishermen, consumers, and the complex pelagic ecosystem.

Public outreach has always been a vital component of my scientific career, and is increasingly important to conservation and preservation of our natural resources. As a graduate student and beyond, I plan to incorporate my community in my research and rely on it to further reach out to expand the impact of my work. One of the benefits of being directly involved with education and outreach programs while conducting my research has been the opportunity to share current, relevant, and applicable information with my community. Throughout my undergraduate career, I travelled back to my hometown to lead squid dissections and share marine science career opportunities with elementary and high school classes. In addition, I have conducted multimedia presentations of my college fieldwork to high school biology, environmental science, marine biology, and AVID (Advancement Via Individual Determination) classes as part of the high school's career readiness program. I was asked to design and lead a Boy Scout Oceanography Merit Badge program. I presented an interactive lecture on the basics of marine science and oceanography to the troop and their families. In addition, I led a comprehensive tour of the Long Marine Lab at UCSC, focusing on the broader impacts of the current research and experiments. I demonstrated the wide range of studies a marine lab can support and exposed them to a unique subset of possible career paths.

The influence of abiotic factors on biological communities has been and will continue to be a common theme in my graduate and professional research. Further, I am excited to frame my ecological questions in the context of anthropological needs and usage, key elements when examining conservation and management of resources in these marine systems. Through my research collaborations and travels abroad as a student and dual citizen of the United States and the United Kingdom, I have learned to embrace different perspectives, to be sensitive to cultural nuances, and to use my communication skills to bridge cultural divides. Such communication skills are vital to developing and improving management strategies of the ocean, a resource that cannot be confined by human-determined boundaries; it requires a multi-national network of management.

Upon completion of my degree, I will use my new set of tools and fresh perspective to guide coastal management decisions and mentor young scientists. The leadership and communication skills that I have developed during my academic career and community involvement demonstrate the strong skill set, determination, and perseverance that are essential qualities in a Ph.D. candidate and NSF Scholar. My ability to use networking skills to seek out people and opportunities, both inside and outside academia, will strengthen existing relationships between the scientific community and the world it serves. As a member of the broad-reaching scientific community, I will use support from the NSF to contribute to the development of innovative conservation solutions.