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Sails, Sharks, and Stomachaches: My Voyage through the Pacific

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Through thick rain, the light of dawn was about to arrive. I was on bow watch, green with the rolling of the boat. Even as the droplets hit my face, the cold wet deck called out to me to lie down for just a few seconds of sleep. “No,” I reminded myself, “there is no sitting on watch.” The last few hours had stretched out like eternity as I struggled to stay awake and vertical, fighting off extreme nausea and fatigue to watch the horizon for boats I knew would not be there.
As I watched the swell rise and fall around the boat, saliva began to pool in my mouth and I was hit with the unmistakable knowledge that my stomach was about to fail me once again. I leaned over the dark edge to heave, but there was nothing left but bile to come up. I had not eaten for days. Or was it weeks? I could not remember. On the boat, day and night blended to create the illusion that hours were years and weeks were minutes. My abdomen cried as it squeezed from me what it could and then released me to the deck. There, slumped in desperation, I could not help but ask myself, “Laure, why the hell did you choose to be here, caked in vomit and grease, strapped to the rail of a rocking ship in the middle of the fucking Pacific Ocean?”

During my five and a half weeks aboard the Sailing School Vessel (SSV) Robert C. Seamans, I asked myself that question often. Most of the time I was able to remember the answer. Sometimes not. That particular morning, the reminder came in the form of squeaks and chirps. The morning light brought with it clear skies, calmer seas, and hundreds of playful dolphins. They danced around the boat, splashing, jumping and twirling, making me feel like this day, this trip was a gift. That is how it was on the boat; extreme physical and mental challenges interlaced with moments of pure joy.

I was aboard the SSV Robert C. Seamans for half of an eleven-week semester through Stanford@SEA. The semester began with an intense course load at Hopkins Marine Station on oceanography, nautical science and maritime studies. Then we boarded the 135ft sailboat where we would learn to sail and complete independent research while propelling ourselves across the Pacific Ocean. We started in Hawaii, sailed down to the equatorial Pacific, where we visited Christmas Island, Fanning Island, and Palmyra Atoll before returning to Hawaii. Figure 1 maps out our specific cruise track.
Technically, it was class. I was there to learn oceanography and ship handling and to conduct research, all of which I did. However, while my research was an inspiring part of my experience at sea, the entire passage was far more than just an academic exploration. To truly understand what my experience at sea meant in my life, it is critical to look both at my scientific and my deeply personal journeys. In the end, it was the desire for both of these journeys that drove me to the middle of ocean and it was the combination of both that brought me home confident.

Before classes even began, our leader, Captain Phil, asked us to write our aspirations for the course on a note card that would be returned to us at the end of the trip. Mine read:

_I hope to gain the strength to stand on my own two feet for all my future adventures and life’s voyages. The challenge of this undertaking promises to inspire personal growth and introspection._
Clearly, I hoped this would be a personal odyssey of sorts, one in which I would learn as much about myself as I would oceanography.

In many ways my research was vitally important to my time at Stanford@SEA. However, the most significant guiding factor for all of my experiences at sea was a matter of the heart. Nothing that occurred during those weeks on the boat can be truly understood without putting it into the context of my personal life. My first day on the SSV Robert C. Seamans was also my first day out of a three-year relationship with my first love. My aspirations on that note card echoed my great desire for individual growth as I moved away. On my first afternoon on the boat, I reflected about the ending of my relationship and the start of this adventure, writing:

*I think that it was too comfortable, which made it both difficult and necessary to leave. I need to prove to myself again that I am capable of being on my own. I became too reliant and even more troubling, I became we. For months I have felt this need to break free from the confines of being part of a partnership rather than being an individual.*

*On this boat I am just alone. He can’t help me. I have to pull it together myself and with my other shipmates. The timing is right. This trip seems like it will be the perfect voyage to push my personal strength, to reaffirm my capabilities and my weaknesses. But the experience will be all my own. Is that selfish? I don’t know, but I do know that I was deeply called to change something, to step out on my own. So here I go...*

In that light, it is clear that everything I did on the ship was in an effort to reclaim myself, to take control over my education, my future career, my body, and my attitude. I was thoroughly lost. I desperately needed to push myself and feel the full range of my emotions
and physical abilities. I wanted the trip to be uncomfortable (which it certainly was) because I wanted to see how I would handle it. Would the struggle help my light to return? I sought an adventure, a departure from the comfort of my secure life.

That alone, however, does not explain why, with my propensity for motion sickness, I had to choose my new adventure to be on a rocking boat. The answer to that is tied less to my love life and more to one of the greatest guiding passions in my life. Although the ocean has never been kind to my stomach, the rest of my body has loved it dearly. Nothing else has had such a rejuvenating and healing power over me.

At three months old I was gently held giggling underwater. Three years later, I ran gleefully into crashing waves. Finally at twelve, with a tank two-thirds my size and a regulator pinching against my braces, I descended upon a new world, Australia’s Great Barrier Reef. I dove with a white tip reef shark and watched Christmas tree worms quickly retreat. I was dazzled and delighted by the colors of the soft corals and the grace of the black durgon fish.

I knew little about the complex intricacies of the coral reef ecosystem I was exploring, but I emerged from that first dive with a child’s optimism and a new conservation ethic. I felt drawn to explore the ocean’s splendor and a deep urgency to preserve all that I encountered at depth. From that point on, I carved my path in the direction of the sea and began preparing myself for a career in marine conservation.

This path brought me to Stanford, where I chose the oceans track within the Earth Systems Program as my major because I was looking for an interdisciplinary approach to environmental problem solving. Despite my weak stomach, the marine scientist and the marine explorer in me never hesitated when the opportunity for Stanford@SEA became
available. It is also not surprising that when the time came to design my research project I was drawn to the very same dynamic web of life on coral reefs that first inspired my love for marine ecology.

Over the years I had learned that beyond being a spectacular place to explore, coral reefs are among the most diverse and complex ecosystems in the world, providing habitat for multitudes of associated fish and invertebrates. These vital ecosystems support a significant portion of the world’s fisheries and are a central location for many tourism activities including my favorite—scuba diving. Additionally, the reef structure itself provides critical storm and wave protection for valuable coastal property.

I was alarmed that even within my lifetime, exploitation by our growing human population had caused substantial damage to coral reefs around the world. The major threats include global climate change, coastal development, pollution, invasive species and overfishing. The last, intense fishing, has been and continues to be the most prevalent threat to the ocean’s coral reefs. Considering that fishermen tend to disproportionately target large long-lived species at the top of the food web,\(^1\) fishing has the potential to alter all food web dynamics, leaving the reef more vulnerable to all of the other threats\(^2\). Coupled together these threats, all direct or indirect consequences of human development, have jeopardized the health of the majority of the world’s coral reefs. The United Nations Atlas of the Oceans estimates that greater than 27% of coral reefs worldwide have already been lost.\(^3\)

To make matters worse, recent ecological trends point to a systematic reduction in coral reef resilience. In other words, reefs are having more and more trouble recovering from disturbances. Examples from all around the world highlight the increased vulnerability of today’s reefs. Temperature spikes in 1982 and 1997-1998 led to massive heat stress, causing
corals in every ocean to expel the symbiotic algae living in its tissues. This stress response is called “coral bleaching,” since it leaves the coral white. More coral died from these bleaching events than any other in history. In the 1980s Caribbean reefs lost all branching *Acropora* coral, a type of coral critical for creating the reef structure, as well as the most important grazer, the long-spined sea urchin, *Diadema antillarum*. Even the relatively pristine Great Barrier Reef has suffered a steady decrease in living coral over the past forty years, accompanied by a disconcerting increase in both bleaching events and outbreaks of coral-eating, crown-of-thorn sea stars.4

It was abundantly clear to me that immediate action was critical in order to ensure the future health of coral reef ecosystems. Unfortunately, effective management largely depends on a strong understanding of the ecological interactions affecting reef resilience, which was (and still is) poorly understood. With this bleak picture in my mind, I began to develop a research project. I was strongly motivated by a desire to try to inform policy by illuminating a piece of the process reducing reef resilience. Plus, I will admit, I was also deeply called to spend time exploring healthy coral reefs while I still had the opportunity.

Following the lead of my friend Charlotte Stevenson, who had survived Stanford@SEA two years earlier, I began researching the effects of historical fishing on coral reef ecology. To really understand the effect of fishing on food web dynamics and thus resilience, it would be first essential to gain a clear picture of the ecological relationships on a pre-fishing coral reef to serve as source for comparison. Charlotte had identified Palmyra Atoll as a potential site for such a study, although her own research had been limited by time constraints. My cruise track, which brought us to three different atolls, including Palmyra, all
with varying levels of historical fishing, lent itself perfectly for such a comparative ecological study, and thus I decided to pick up where Charlotte had left off.

While still in Monterey, I needed to gain a more comprehensive understanding of coral reef ecology and the history of fishing. To be honest though, in the midst of a breakup and exhausted by the workload and schedule of classes, I wasn’t highly motivated. However, as I slowly gained a greater context for fishing disturbance, I began to truly appreciate the potential significance of the research I was about to conduct. It created the impetus I needed to throw my whole self into this work.

I found that traditional marine ecology, like terrestrial ecology, presented a community model in which biomass decreases as you move up the food web. Each level in the food web is called a trophic level. The organisms in each trophic level use some of the energy they consume for their daily needs, without converting it into biomass. Thus, less energy is available to make biomass in the subsequent trophic layer. For example, on land there is less lion biomass than antelope biomass, and less antelope biomass than grass biomass. Ecosystems are therefore often represented as a pyramid with low trophic level organisms filling the large base. Apex predators, which make up the highest trophic level, fill only the tip of the pyramid.

Interestingly, I learned that this well accepted model had recently been questioned for coral reef ecosystems. Charlotte had found a new study, which suggested that prior to human exploitation the initial structure of these communities was instead dominated by apex predator biomass, thus flipping the pyramid upside-down. The study showed that in the relatively pristine and unfished Northwestern Hawaiian Islands, apex predators—in this case sharks, snapper, jacks, barracuda, and grouper—comprised 54% of total fish biomass. In
contrast, in the Main Hawaiian Islands where human exploitation and fishing were prevalent, apex predators were only 3% of the total fish biomass. Using the same sampling methods, Charlotte had amazingly found that on the virtually unfished Palmyra Atoll top predators contributed 64% of the total fish biomass. These staggering numbers begged the question: how could marine ecologists have gotten it wrong for so long?

In reality, fishing pressure significantly reduced most apex predator populations throughout the oceans prior to the beginning of the 20th century. Thus, the traditional community model for coral reefs was based on observations made in already altered ecosystems. Then fishermen around the world continued to target apex predators, causing a further decline of over 90% worldwide. An accurate ecological model for coral reefs needed to account for this considerable change to the community structure, which was something I was hoping to do.

The next question became, to what degree does this removal of apex predators affect the rest of the food web and thus the resilience of the reef? Depletion of apex predators can induce many sweeping changes to the structure of ecosystems as the effects cascade through the lower trophic levels. For example, say sharks are selectively fished. Their prey, fish that eat grazing sea urchins, may increase, which may in turn cause a decrease in those grazing sea urchins and ultimately lead to an increase in algae that grows on and kills the coral. In this way, simply fishing sharks could significantly harm the reef. Such shifts have been observed in coral reefs all around the world, suggesting that the influence apex predators have on coral reefs may be necessary to sustain the overall health and resilience of these ecosystems.
I saw these trophic cascades as part of the core explanation for why reef resilience was diminishing worldwide. Unfortunately, as continued fishing pressure alters more reefs it becomes increasingly difficult to study these interactions. Yet I, one of the luckiest students alive, was about to sail to one of the last predator dominated coral reefs in the world, Palmyra Atoll. My plan was to duplicate and expand Charlotte’s survey in Palmyra and then further compare the fish community structure found there to that on nearby Christmas and Fanning Islands. These three atolls in the Line Islands, where we would be exploring, share similar oceanic conditions but differ along a clear gradient of historical fishing pressure and human use.

Christmas and Fanning Islands are part of the small island nation of Kiribati. Christmas Island has been inhabited for approximately 2,000 years, and currently supports 7,000-8,000 inhabitants and commercial, subsistence, and localized sport fisheries. They also have an active shark fin trade with Asia. Fanning Island’s population has recently escalated to approximately 3,500 due to a Kiribati citizen relocation program; however the island historically sustained a much smaller population. Fanning Island represents a level of historical and current artisanal fishing that is likely intermediate between Christmas and the uninhabited Palmyra. Although there is not a shark fin trade on Fanning, locals hunt sharks to make trinkets for tourists who visit the island from cruise ships.

Palmyra Atoll is the northernmost atoll of the equatorial Line Islands. Privately owned for 100 years and purchased by The Nature Conservancy in 2000, Palmyra is now under the jurisdiction of the US Fish and Wildlife Service as a National Wildlife Refuge. With its minimal historical population and current population of four refuge managers and their dog, Dadoo, Palmyra never had an extensive fishery like those found on the more
populated Line Islands. Although Palmyra’s inner lagoon was significantly altered by the U.S. Navy, which occupied the atoll during World War II, the outer lagoonal reefs, where my study was going to focus, were less disturbed by humans.

At this point the focus of my study was set, but I had the hardest part still ahead of me—getting to the islands. Acclimating to the rhythm of the boat, both the physical motion and the grueling schedule, was almost enough to drain every ounce of excitement I had for this voyage. I barely ever slept, certainly never for more than four hours at time and when awake I spent my time evenly divided between vomiting, cleaning and heavy lifting. After the sixth day of neglecting my journal I jotted down a quick note capturing the last week.

Can’t write, I will try if the puking ever stops. Everything hurts. I must study the lines of the ship and then try to sleep before watch again.

To be fair, it wasn’t all bad. In fact, for a few days before we reached Christmas Island, I actually felt substantially better. On our tenth day at sea, at one of my highest moments I wrote:

I don’t think I could ever get tired of looking at the ocean, seeing blue extend out forever. The rhythm on the boat has begun to have a truly sweet feel. When I am lookout on the bow, the warm wind feels like an embrace, a loving reminder to open my eyes to everything around me. The stars and the sun help guide our little boat as we follow their movements in the sky.

But then, on day eleven, we hit a series of squalls and I was yet again miserably ill. By the time we reached Christmas Island I could barely contain my excitement to start researching, mostly just because it would get me off that rocking ship. The night before we arrived we
celebrated with a Christmas Eve swizzle (boat talk for party), but nothing was more thrilling than spotting the first line of palm trees the next morning on the shore of Christmas Island. That truly felt like a holiday present.

At all three islands, I spent almost every available moment in the water sampling the fish. I kept my methods consistent with both Charlotte’s study and the one conducted in Hawaii. I selected three backreef lagoonal locations on the leeward (protected) side of each island and one extra windward (exposed) side on Palmyra, giving careful consideration to identifying locations with similar physical parameters, such as wave action, water quality and depth. At each location I conducted three to seven randomly placed 200m² snorkeling transects. In total, I surveyed 49 transects—15 at Christmas Island, 14 at Fanning Island, and 20 at Palmyra Atoll.

For each transect, my buddy and I slowly swam next to each other, as I released a 50m transect line between us. My buddy identified the family of every apex predator within 2m on either side of the line and estimated its size. I did the same thing with every other swimming fish within the transect area. Like the other studies, I considered apex predators to be jacks, snapper, sharks, grouper, and barracuda. I only had two to three days to sample at each island and thus I worked virtually continuously to obtain as much data as possible. With strong currents and lots of gear to keep track of, the field work was extremely challenging, but in the end I could never complain. I was spending my days doing my favorite thing—swimming around on a reef observing the life.

Back on the boat I converted the length estimates to biomass using species-specific length-mass relationships published on Fish Base, an extensive website that collects information on all known fish species. The equation is \( M = aSL^b \), where \( M \) is mass in grams,
SL is the standard length measured in centimeters, and a and b are species-specific constants. I averaged the a and b constants for each family based on the dominant fish species found. Once I had my data, I ran a statistical test called ANOVA to determine if the differences were great enough not to be attributed to chance.

Despite having basically the same oceanographic conditions, the three islands had remarkably different reef dynamics. Without even sampling, many notable differences could be observed. The reefs at Christmas Island were beautiful. I was completely enthralled by the giant glowing neon clams that were interspersed throughout the reef. I saw lots of small snapper, but only one single fish greater than 50cm. I did, however, meet the true apex predators of the reef. Sadly, all around the island, local fishermen were setting gill nets to catch the few remaining sharks in order to send their fins to Asian markets. At Fanning, virtually the entire reef had been destroyed, but there were still substantial fish schools everywhere. I saw dolphins and a huge beautiful bumphead parrotfish, but as with Christmas Island, I saw virtually no large apex predators.

Palmyra, though, was completely different. It was almost electric as the reef bustled with energy and life. Although we saw no sharks at either Christmas or Fanning Islands, I could not go more than a minute or two without seeing one at Palmyra. I described one Palmyra site called coral gardens in my journal:

*The reef looked like a bustling cosmopolitan street with diverse fish crossing through openings in the coral. A school of chub would file through, followed by a line of goatfish, which where intersected by a large snapper. It was an overwhelming visual delight with more activity than could be comprehended.*
The ecosystem was utterly vibrant and I was right there in the middle of it. There was power in the water every time a shark swam by, prowling the reef. I was never scared, but totally humbled by the grace and strength of these hunters around me. At times they would circle me, with each loop reminding me that this was their reef. It made me so grateful they were still there to own it.

Empirically, my data confirmed my general impressions. Across all sites, Palmyra supported substantially more fish biomass than either Christmas or Fanning Islands. In fact, I found that the total fish biomass on Palmyra exceeded any published value worldwide. Palmyra had a total fish biomass of $4.55 \pm 0.65$ tons/ha, which was 415% greater than Christmas Island, and 306% greater than Fanning Island (Fig. 2). This value is also 186% greater than biomass estimates for the northwest Hawaiian Islands, and 691% greater than in the Main Hawaiian Islands\textsuperscript{12} (Fig. 2).

![Figure 2. Total Fish and Apex Predator Biomass.](image-url)
As predicted and blatantly clear when in the water, the most dramatic difference between the islands was the predator populations. Palmyra had an astonishing 573% more apex predator biomass than Christmas Island, and 728% more than Fanning Island (Fig. 2). On average, apex predators made up 62% of all fish biomass at Palmyra. Thus, the study had confirmed that coral reefs lacking a history of human exploitation could sustain the highest apex predator levels reported for any natural ecosystem.

The difference between the reef systems was even more pronounced when mature apex predators greater than 50cm were compared. At Palmyra, the biomass of mature apex predators was 24 times greater than at Fanning Island, and 75 times greater than at Christmas Island (Fig. 3). Large apex predators accounted for 55% of total fish biomass at Palmyra, in contrast with 7% at Fanning Island, and 3% at Christmas Island (Fig. 2). Even though reef sharks accounted for over 2/3 of the large apex predator biomass of Palmyra, when sharks are excluded from the analysis, Palmyra still supported significantly greater total apex predator biomass.

![Figure 3. Distribution of trophic levels across the Line Islands](image-url)
As I analyzed the data, I was consistently amazed that I had set out with a question and was actually getting an answer. My study clearly demonstrated an inverse relationship between fishing pressure and both total fish biomass and apex predator biomass on coral reefs. When I compared the results with the Hawaii study and Charlotte’s data the trend became unmistakable. Fishing had dramatically affected fish communities on coral reefs.

To further verify my results I also wanted to confirm whether or not predators had simply moved to deeper waters at fished locations. To answer this question I used a remotely operated digital video camera to survey from 10-100 m depth at Palmyra and Fanning islands. Just like in shallow water, the difference between the reefs was abundantly clear. In the two video transects at Fanning Island between 10-50 m depth, the only fish visible were large schools of fusiliers (Caesionidae), which are at the bottom of the food web, eating tiny plankton. In contrast, the transects from Palmyra recorded schools of large twinspot snapper (Lutjanus bohar), humpback snapper (Lutjanus gibbus), and large groups of gray reef sharks (Carcharhinus amblyrhynchos). In one video-frame alone at 15 m depth there were 24 gray reef sharks.

When everything was considered, my study supported the emerging model for predator dominated coral reef ecosystems. It showed that the natural state of coral reefs prior to human exploitation include greater than 50% apex predator biomass, which is substantially more than previously hypothesized by traditional marine ecology.

Although this apex predator dominated model seemingly contradicts the laws of energy transfer within ecosystems, it can potentially be explained by the rapid turnover of lower trophic level biomass in the marine ecosystems. Marine primary production has a substantially faster rate of biomass turnover than in terrestrial ecosystems. The apex
predators on coral reefs are long-lived species, which can slowly accumulate biomass. Thus, at any given time the standing stock of lower trophic level organisms is low, but it is continually replenishing itself and feeding the larger standing stock of apex predators.

Using Palmyra as an indicator, it is clear that reefs are capable of sustaining extraordinarily high levels of apex predator biomass without depleting the biomass of lower trophic level fish. Not only did the biomass of apex predators increase in Palmyra, but the total biomass of lower trophic level fish significantly increased as well (Fig.3). The biomass of herbivores, arguably the most important group for reef health, increased significantly at Palmyra. Overall, the presence of high apex predator biomass did not limit the biomass of lower trophic level species, but rather seemed to facilitate a more dynamic and healthy reef. This finding was particularly important because skeptics of marine protected areas fear that the accumulation of predators within marine reserves will have a detrimental effect on other fish stocks. My study strongly suggested that in reality the opposite is true and that no-take areas where predators are conserved may actually enhance the lower trophic level fish stocks.

Throughout the whole process, I was thoroughly inspired by the research I had just been a part of. When the study was complete, I was proud to report that Palmyra Atoll presented a potential view of a natural coral reef ecosystem prior to the influence of fishing. This view showed an unprecedented level of apex predator biomass. When it was compared to Christmas and Fanning Islands, a clear link was established between fishing and a reduction in both total fish biomass and the dominance of apex predators. This trend dramatically alters ecologists’ traditional understanding of coral reef dynamics, providing a critical baseline for future management.
As with most scientific studies, more questions were generated than necessarily answered. Further study is certainly needed to establish if there is an additional link between the removal of apex predators and a decrease in overall reef resilience. But even so, it seemed like we had found one of the keys to the many locks preventing effective coral reef conservation. There were moments when I pridefully imagined our study revolutionizing coral reef management, thus saving the world’s sharks and reefs. Then I returned to reality and remembered how difficult it is to actually catalyze change. There are so many important studies published that get completely ignored. I hoped my work would at least provide a small incremental contribution in the effort to understand marine ecology.

While on board the ship, I spent a lot of time reflecting on the effectiveness of science to inform conservation. With this study, I had so much hope in my hands, and yet, even when I was really excited about my research, there were moments on board when I felt so small and futile. On the return sail from the Line Islands back to Hawaii I wrote:

*Except for the seasickness, sailing is quite a way to travel. It allows you to feel the incredible distance. Each day as we see only blue and we slowly glide through it, I am reminded how large this blue planet really is.*

*Who am I to try and protect it? It is so large with so many places for people to hide, people who harm it directly or indirectly. Can science actually help to protect it? Can training respectful divers actually increase stewardship or is ecotourism just further making nature a commodity for the rich to exploit?*

*Each day I learn more ways that I leave a harmful footprint on this planet. How can I even out the impacts? Despite spending all (or at least a lot) of my energy on educating myself so that I will be trained to work towards conservation, I can’t imagine that I am doing enough. I will certainly try, but realistically how much can I actually accomplish?*
Seeing the enormity of the ocean reminded me just how difficult conservation truly is. I knew that my study had the potential to inform policy, but would it? And if it did, what would that mean for the people of islands like those in Kirabati? The residents of Christmas and Fanning Island don’t have many other economic opportunities. Restricting fishing may jeopardize their subsistence. The islands are already almost completely functioning off of foreign aid. What should be valued more highly, the health of the reef or the health of the people? I would say the people. Science may be a valuable tool towards understanding natural systems, but it alone cannot create solutions for our environmental crises.

For the people of Kirabati, the development of a small but functioning economy would be a critical step before any attempts to limit fishing could be realistic. At this point the people live off of income from fishing and coconuts. Great Britain buys the latter at an inflated price as a way to indirectly provide aid. Although enhancing the economy might drive more immigration and thus resource use, it would also allow the citizens of Kirabati to support themselves without sacrificing the health of their reefs. Not only are the people of Kirabati dependent upon fisheries, but considering the islands have a maximum elevation of two meters, intact reefs are very critical for maintaining the structural integrity of the islands. Thus, Kirabati needs a sustainable product fast that doesn’t further jeopardize the reefs. Ecotourism in conjunction with the manufacturing of cultural crafts could be one possibility. The people on both Christmas and Fanning Islands were spectacularly welcoming, and thus I imagine would easily interest visitors.

In the end, the research project may not be a spark for world change, but it did help to reignite my own passion. With the exception of writing the paper while seasick, I loved every minute I worked on the project. I clearly still have questions about how to best affect change
and balance human value with that of natural resources, but at least I know that I am capable of asking meaningful questions with real ramifications for ocean conservation.

On a more personal note, through the various shades of green, I did find my light. My time on board the SSV Robert C. Seamans was neither easy nor always enjoyable. The truth was I was seasick for four of the six weeks and experienced a few of the most miserable moments of my life on that boat. Yet, when I was given back my original note card, I smiled, feeling my new strength. My shipmates and I propelled ourselves from Hawaii across the Pacific to the Line Islands and back again, solely with a little bit of wind, fuel and a lot of perseverance. In the end, very little is more empowering than that.

I had truly challenged myself, but more importantly in the isolation of the Pacific I had also taken time to really listen to myself. On nights when the seasickness wasn’t too bad, I would stand under the brilliant stars, meditating on all the possibilities in my life. The heartache was not over, but I had regained clarity and I knew that I would heal. There had been moments on the boat when it was so hot I thought I would roast and then just when I couldn’t take it anymore the skies would open and glorious rain would cool me down. I knew that it would be the same with my heart. Comfort would come with time.

From the plane flying home over the Pacific I finished my journal. My concluding remarks read:

_I can see so much of the ocean from here. We are buzzing over it like it is a tiny pond to cross. I can see the large swell and the white caps from the window, but I can’t feel each one rock me. I thought that I had a pretty good knowledge of the ocean before this trip, but now I have started to feel the ocean’s dance. From up here she looks so docile, large and yet so manageable._
I could not grasp the strength of the waves before each one sent me to the rail. Likewise, I had no capacity to understand the magnitude of the Pacific Ocean until I crossed it, or the electricity of a healthy reef until I was shocked by it. True learning and growth doesn’t always come easily. I had to actively engage. In retrospect it is clear that every day I was on that boat was a privilege. Everyday I am on this planet is a privilege and thus I want to completely immerse myself in it. After my time on the boat, I am confident that there is very little I cannot do with a little extra dedication.

I am not sure what the next phase of my life will bring. The ocean still provides me with a steady stream of inspiration, constantly buoying me up. I am confident I will never travel too far from it, although I will need to let my stomach recover before punishing it on a boat again. Now the key is to capture the same enthusiastic drive that brought me to the SSV Robert C. Seamans and to let it guide me through all of my future adventures.
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