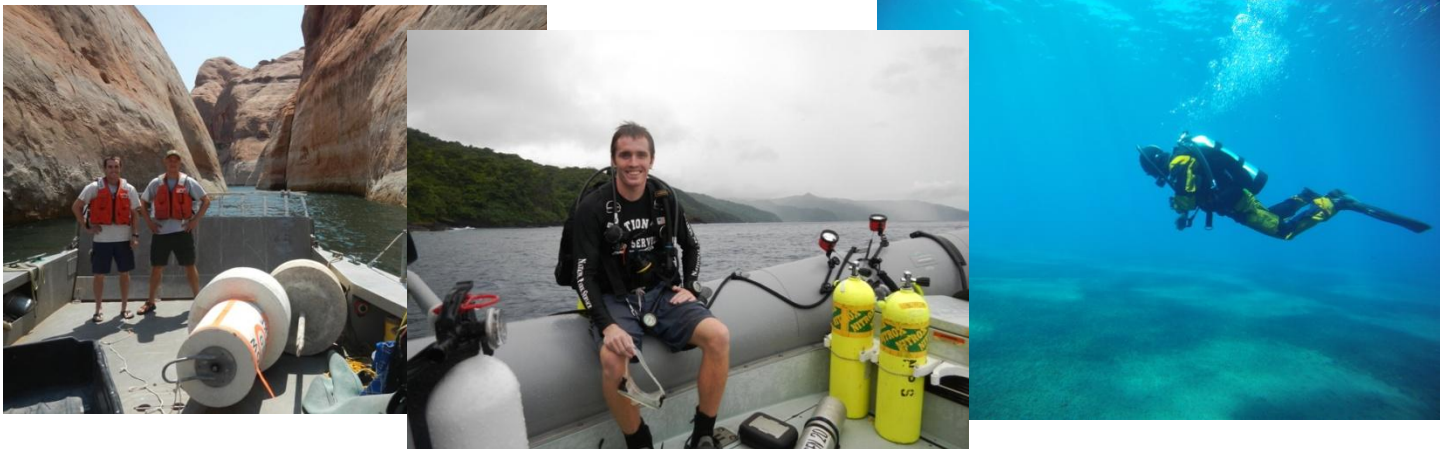




How exactly do you summarize 20,000 miles of travel, a dozen National Park Areas, tons of incredible people, and three months of SCUBA diving in our nation's most beautiful locations? Though I'm still not entirely sure, that is exactly what I'll be trying to do in this final report for the 2012 Our World - Underwater Scholarship Society/National Park Service Submerged Resources Center Internship! This dream internship gives a young diver the once-in-a-lifetime opportunity to live, work, and SCUBA dive in the nation's most remarkable areas for several months. The lucky intern is free to travel to distant areas of the National Park system while working with some of the nation's leading scientists, law enforcement rangers, and other diving experts.

In my opinion, one of the most incredible aspects of this internship (besides a \$10,000 budget for travel and living expenses) is the fact that the experience is hand crafted to the intern's strongest interests. Since the National Park Service runs the nation's oldest non-military dive program and supports biologists, archeologists, underwater photographers, and law enforcement rangers, there are plenty of opportunities to learn from a variety of experts. For example, Naomi Blinick, the 2011 intern, had a strong interest in underwater photography, so her experience was tailored around learning from some incredible photographers. As a hopeful marine scientist, I was given the chance to work with a variety of scientists in parks from Oregon to American Samoa (and many places in between!). Although the world needs scientists and resource managers that are experts within a specialized field, I think it's critically important to gain a broader perspective of global problems and patterns at the start of your career. With the help of NPS dive teams all across the country, I was able to gain a much better understanding of the problems facing our oceans and what we can do to help!



The Submerged Resources Center (SRC) is made of underwater archeologists and photographers who identify, document, and study the underwater resources of the United States. They have successfully executed a huge variety of projects, ranging from the recovery of the world's first successful combat submarine (the *H.L. Hunley*) to the filming of thermal vents at Yellowstone National Park. Because the SRC dives with so many different people all across the country, they are the perfect team to guide an intern through months of independent travel.

Last August, I flew to the SRC office in Denver, Colorado after months of excitement and anticipation – the internship finally began! I spent the first week eagerly meeting the members of the SRC, completing the Blue Card swimming/written certification exam as required to be an NPS diver, and investigating prospective parks. Planning the specific path of the internship initially seemed like an overwhelming challenge since I was ultimately free to decide my own path. The SRC offered fantastic suggestions and provided me with as many details as possible for potential parks, but it was both daunting and exciting to be given so much freedom!



During this first week of the internship, I was most struck by the genuine passion and dedication that I quickly came to expect from National Park Service employees. I had no real understanding of federal careers prior to this internship, with even less of an idea of government diving. Throughout this week and the three months that followed, I consistently worked alongside the types of individuals that I am sure could thrive in any profession of their choice. As a nation, we couldn't be luckier that these individuals collectively joined forces due to strong belief in the conservation-minded mission of the NPS.

My first dives of the internship took place in Glen Canyon National Recreation Area, which is located just east of the Grand Canyon and includes Lake Powell, parts of the Colorado River, and huge expanses of desert wilderness. Unexpectedly, my very first dives of the internship actually took place in the most challenging visibility that I would experience for the next three months! Within five minutes of beginning our first dive, I found myself unable to see my own hand in front of my face, and very thankful that I was given such thorough training and briefings before encountering those difficult conditions.

The mission of the Glen Canyon Underwater Recovery Unit was definitely not lined up with my scientific interests, yet the experience actually proved to be one of the most influential of the internship. Glen Canyon is a very popular vacation destination, and a high concentration of so many boaters in one unfamiliar location unfortunately leads to frequent accidents and boat fires. Our mission was to search out and remove acid-leaking batteries, electrical equipment, and tons of other debris that enter Lake Powell by accidents or pollution. For one week at Glen Canyon, I had the chance to see a great example how NPS diving works: thorough preparations, a well-defined mission, and a focus on safety.



Diving in the challenging conditions of Glen Canyon was actually the perfect way to begin the internship. I'll always laugh when I remember the advice I received just before my first dive of the internship. I was told to "imagine throwing a handful of random coins onto your front yard, blindfolding yourself, and then trying to find exactly fifty cents." I gradually became accustomed to using my hands instead of my eyes as my primary search organs in zero-visibility conditions. We found all sorts of unusual and dangerous materials (a rifle, many batteries, charred houseboat debris, and a complete barbecue set) as we remove thousands of pounds of trash from Lake Powell!

After I finished a great week with the Glen Canyon crew, I headed towards Crater Lake National Park in the mountains of Oregon with false confidence that I had gotten a handle on this "travelling dive internship" thing. After the airline temporarily lost a piece of luggage containing all my dive gear, a rental car shortage, and 50 degree change in



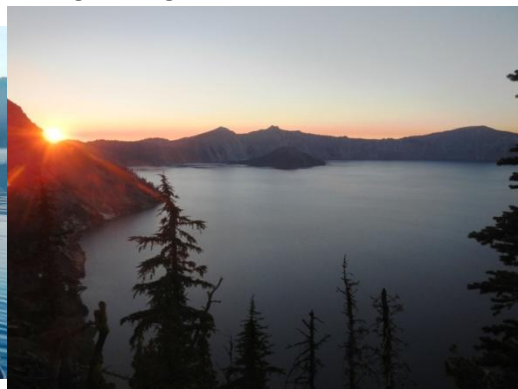
temperatures from an Arizona afternoon to an Oregon evening, I began to learn one of the most important lessons of the internship: flexibility is key! Unpredictable problems or uncontrollable delays are bound to occur at some point during months of travel. As I began to learn during my first few hours in Oregon, it's the wise intern's job to take these issues in stride and remember that they're dealing with these issues in order to dive in the most beautiful areas of the country! After just a few extra hours at the airport, I was happily on my way to one of the most unique bodies of water in North America.



Crater Lake formed over 7,000 years ago when a violent volcanic eruption created a massive container for the rains and snowmelts of the Pacific Northwest. All that water has also made Crater Lake the deepest lake in the United States, with a maximum depth of almost 2,000 feet! Powerfully contrasted with the surrounding evergreen forests, the uniquely blue hues of the lake seem more fit for a neon sign rather than a pristine lake.

I arrived at Crater Lake during their peak water and plankton sampling period, so the majority of my time was spent assisting their massive collection efforts from their trusty research vessel. Led by ecologist Mark Buktenica and biologist Scott Girdner, we spent several full days collecting water from as deep as 1,800 feet and zooplankton samples from shallower depths. I have a limited background in freshwater ecology so I was excited to hear about the combination of factors that produced such a unique lake. As our sampling would confirm, the lake's water is unusually low in nutrients, aquatic life, and organic debris, resulting in its famously superb visibility. I eventually did some diving in Waldo Lake, a nearby lake that is occasionally studied for comparison with Crater Lake. During two chilly drysuit dives, our team searched for newts that could be used in genetic comparison to the newts of Crater Lake, which may actually comprise a distinct and new species!

Throughout the week at Crater Lake, there was an assortment of university researchers, graduate students, and USGS researchers that joined in the sampling. This marked my first observation of a larger and very encouraging pattern that this internship revealed to me: a strong collaboration between NPS scientists, university researchers, and other government researchers. Prior to my involvement with the NPS, I used to think of those groups as very separate entities. This assumption was proven false time and time again, as scientists and managers from a variety of parks improved their stewardship of public resources by involving colleagues outside of their own staff.





The next leg of the internship showed me how familiar territory can look completely different with just a slight shift of perspective. Just one month after graduating from UCLA, I returned to Southern California to dive in the pristine kelp forests of Channel Islands National Park. Despite actively diving in mainland California, I never received the chance to explore this island paradise, so I was thrilled to spend an entire week diving off a liveaboard with David Kushner's Kelp Forest Monitoring (KFM) team! The KFM team is one of many teams that comprise the Park Service's Inventory and Monitoring Program, which has the overall mission of accurately surveying the resources within National Parks on a long term basis. Complex ecosystem patterns can be easily missed or misinterpreted with short term monitoring, so the fact that the KFM team has data from 30 years of diving is remarkably valuable.

Although diving in the Channel Islands was incredibly enjoyable, I quickly learned that collecting this valuable data is no easy task! For one week, the crew of eight and I would dive from sunrise to sunset in order to complete four lengthy dives each day. The whole team happily eats, sleeps, and breathes monitoring during these week-long trips; every single morning, divers awoke eager to get into the water and every evening, the team excitedly discussed the unusual sightings and unexpected patterns of the day. I really enjoyed immersing myself in that productive culture and getting lost in the desire to understand the changes occurring to that Californian paradise. Additionally, the diving in the Channel Islands was absolutely phenomenal. On my very first dive, I saw more fish than I saw in the last year combined! On that dive, I accompanied a pair of divers who were surveying fish populations along a transect line. A gigantic school of Pacific mackerel at least 50 meters long passed us, leaving me grinning, and the fish-counters scrambling to assess such a large group of fish. They estimated the school at over 6,000 fish!



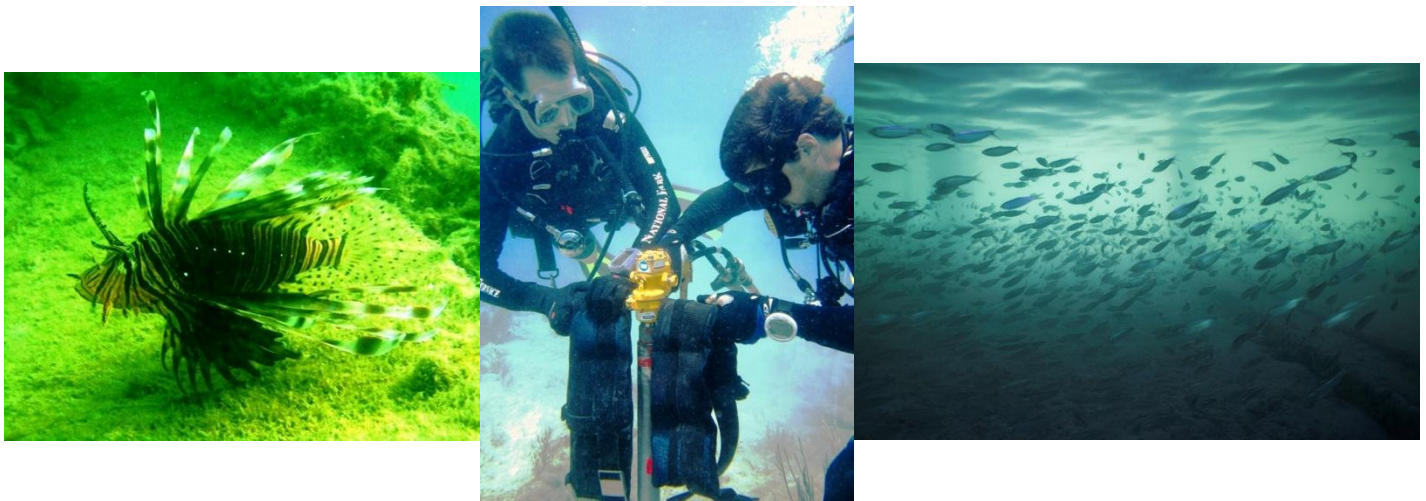
While I loved visiting National Parks in remote corners of the country, I was also very grateful that the NPS preserves resources in heavily populated regions to show the public a pristine example of their own region. Throughout the internship, I took special pleasure in seeing local visitors leave parks with a completely different understanding of their region and their responsibility to conserve the remaining resources. Over 18 million people live within 200 miles of the Channel Islands, but you would never imagine that while getting lost in the raw nature that the park protects.

Trends began to appear as I visited more and more National Park units. Just as each park has very different strengths, from the thriving tourism industry at Glen Canyon to the lonely beauty of the Channel Islands, each park faces equally unique challenges. Biscayne National Park in South Florida contains tons of incredible wildlife, but their communities face a threat that is unique to the Southeast US and Caribbean region: the invasive lionfish. I headed to Biscayne to help



with a number of lionfish studies that aim to protect the coastlines from the foreign invader. Lionfish degrade native marine communities because they have a voracious appetite for small fish and venomous barbs that protect them from larger fish. I really valued the opportunity to watch many different organizations working together to combat larger ocean issues, as that's exactly what I hoped to see at the start of this internship. The park's biologists, Vanessa McDonough and Shelby Moneysmith, work with graduate students, professors, and government researchers across the Southeast to understand this widespread lionfish issue.

In an average workday, we would boat past miles of uninhabited, mangrove-lined islands and crystal clear waters in order to conduct studies at particular reefs and shipwrecks. For the first time in two years, I was able to dive in warm waters that allowed me to ditch my drysuit or thick wetsuit. I saw an assortment of beautiful animals, including nurse sharks and a critically endangered goliath grouper. I helped University of Miami graduate students as they studied how quickly lionfish return to isolated areas after being manually removed, which is very important as manual lionfish removal is occasionally weighed as an option. Across all the parks I worked at, I appreciated the fact that most Park Service research can be immediately applied to real-world conservation efforts.

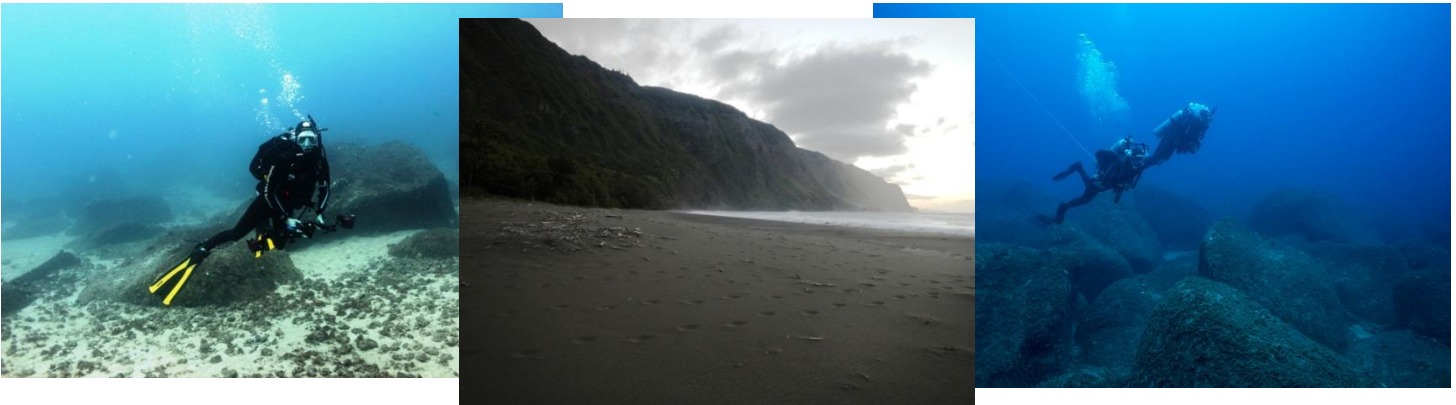


When we weren't studying lionfish, we installed mooring buoys to protect Biscayne's shipwrecks from damage by anchors. To install the buoy's anchor, we had to drill into solid rock using a massive drill while thirty feet underwater! I also had the chance to participate in Biscayne's sea turtle monitoring program. The Resources Management team walks desolate beaches in search for the nests of endangered loggerhead sea turtles in order to protect them from unnatural predators such as raccoons and dogs. This method of protection has been hugely successful, as predation has been reduced from nearly 100% to almost 0%! Finally, I was able to practice underwater photography in the still waters of Biscayne, as the SRC sent me a large camera setup while I was staying there. After negotiating a steep learning curve, I was excited to have a new way of sharing this incredible experience with others.

After Biscayne National Park, I spent nearly two months diving in the parks of the Pacific Islands. My first stop was at Kalaupapa National Historical Park on the Hawaiian island of Molokai. Although I was briefed about the stunning Hawaiian landscapes and profound history that I would encounter at this park, I still could not have imagined the overwhelming experience that I was to come. Unbelievably, Kalaupapa served as the mandatory enclosure of individuals Hansen's disease, or leprosy, from 1860s to the 1960s. Around a dozen cured patients still call Kalaupapa home, though now they reside within the National Historical Park by choice.



In addition to the shocking history of the isolated peninsula, there are healthy coral reefs, impressive sea cliffs, rare monk seals, and lush jungles. Marine ecologist Eric Brown and park diver Randall Watanuki comprise the two-man marine team that manages nearly everything below sea level. I primarily joined them in their efforts to assess coral recruitment within the park. We collected coral recruitment tiles from fifteen different sites around the peninsula, which was a great way to see the entire park!



A highlight of my time in Kalaupapa was actually an unplanned activity. Since powerful swells begin to batter Kalaupapa in the winter, Randall and I had to shelter the park's boat on the opposite side of the island. We passed sky-scraping waterfalls, valleys full of lush jungles, and the world's largest sea cliffs (which reach over 3,000 feet high!) as we made our way to the distant harbor. At the end of the day, we trekked back to Kalaupapa using the only available route; a steep and strenuous three-mile trail that descends 1,800 feet from the plateaus of Molokai to the peninsula. Kalaupapa was the first National Park Area I visited that was established due to historical significance rather than natural resources or recreation. Prior to hearing about this internship, I honestly just pictured the Grand Canyon and Yosemite when I thought of National Parks. As I would learn at Kalaupapa, Pearl Harbor, and an assortment of other areas with profound histories, we are all very lucky that our nation's cultural heritage is vigilantly protected as well.

On the Big Island of Hawaii, I received a whirlwind tour of the National Park Areas that line its coast. With the help of Adam Johnson, Integrated Resources Manager at Pu`uhonua O Honaunau National Historical Park, I managed to see four dramatic National Park units in just four days! At these sites, I had the chance to learn more about the rich history of Hawaii and its phenomenal natural resources. Adam and I walked along the stone walls of Pu`uhonua O Honaunau, where defeated warriors hoped to enter the boundaries of this "City of Refuge." Entrance into this ancient site would protect individuals from prosecution or physical harm. We also toured an impressive wartime temple at Pu`ukohola Heiau National Historic Site.

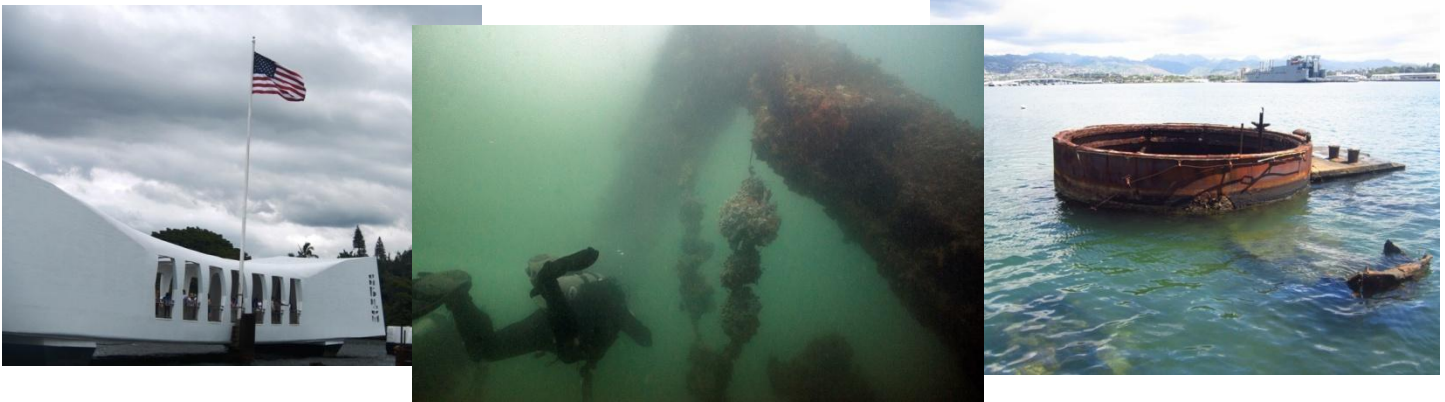




We completed several dives at Kaloko-Honokohau National Historical Park into my short trip to the Big Island. We scrambled over uneven lava rocks to enter crystal clear waters that were filled with hard corals. Later on, we snorkeled around the same area in search of undocumented archeological features. Despite rough conditions, we managed to mark the GPS coordinates of one potential archaeological feature! Before I left the Big Island, I was able to spend an entire day at Hawaii Volcanoes National Park. From the ridge of an active volcano, I could see volcanic smoke billowing hundreds of feet into the air!

At all the Pacific parks I visited, I was very encouraged to see the efforts that are made to include the local community in the conservation process. Even by simply referring to the parks by their original, Hawaiian names, I could see that the Park Service demonstrates a desire to preserve aspects of Hawaiian culture in the most accurate way possible.

The following week at WWII Valor in the Pacific National Monument was full of poignant dives and a surprising focus on marine conservation. Although the Navy salvaged most ships that were sunk in Pearl Harbor, USS *Arizona* and USS *Utah* remain submerged in the harbor with over a thousand fallen crewmembers. Throughout the week, I had the rare opportunity to dive on both ships. We dove in order to collect GPS coordinates of the memorial's dock anchors, which are scheduled for maintenance and to outfit mooring buoys with a new attachment system. Beneath the silent, murky waters of Pearl Harbor, I experienced the strongest feelings of patriotism, gratitude, and grief that I've ever felt below sea level as I solemnly dove alongside the resting place of over a thousand fallen soldiers. I couldn't stop thinking about how fortunate I was to be pursuing a career in my dream field while men my age lay at rest for our country beside me— it was an incredibly humbling and motivating experience.



The park was recently approached by The Nature Conservancy about the possibility of measuring Pearl Harbor's marine life for comparison with Hawaii's Marine Protected Areas (MPAs). I was really excited to learn that my job was to spend much of the next week analyzing the best way to go about this process since I've been interested in marine conservation for years. Although this experience didn't revolve around diving, it shows the central principle of the internship which is so special; the intern's individual interests are directly supported in a real-world setting! Throughout the week, I researched MPA establishment, snorkeled with Cultural and Natural Resources Manager Scott Pawlowski at Oahu's current MPAs, and attended an informative meeting between the park and The Nature Conservancy.

The exact schedule of any week is normally difficult to predict throughout the internship. Unexpected opportunities tended to present themselves when I least expected it, so it was critical to have an open mind. After diving with Mike Freeman, who is a Navy ship pilot in Pearl Harbor, he let me accompany him as he piloted a 950 foot Navy ship out of the narrow harbor that night! As we towed the ship safely out to sea and enjoyed beautiful views of Waikiki and the Diamond Head area at night.



After leaving Hawaii, I travelled to American Samoa, roughly 5,000 miles southwest of California! A National Park full of pristine coral reefs, lush jungles, and rare wildlife is spread over this remote chain of tropical islands. This three-week experience allowed me to complete closed circuit rebreather training, travel throughout the island chain, and dive on the most pristine reefs I have ever seen. Ever since I conducted my senior thesis in French Polynesia, coral reef ecology has been one of my primary interests. We allocated three whole weeks to American Samoa (which seems like months after so many week-long trips!) because there were a variety of excellent opportunities to pursue this passion with ecologist Tim Clark's team of divers.



My time in American Samoa was centered on the closed circuit rebreather training course that the Marine Team and I were able to complete. Closed circuit divers don't "lose" air in the form of bubbles when they exhale; instead, the exhaled air returns to a water-tight breathing loop, where it is then filtered to remove carbon dioxide, enriched with pure oxygen, and guided back into the diver's lungs. Oxygen sensors determine a physiological-ideal amount of oxygen to add at any given depth, which allows divers to absorb less harmful nitrogen and ultimately stay underwater for longer with a decreased risk of getting the bends. Prior to our rebreathers training, we used SCUBA to work on fish-tracking receivers that were stationed on the reefs, though we were often had to rush to finish within our allowable bottom time. Once we were able to use rebreathers, our ability to complete our work greatly increased. We were also able to explore incredible areas during our training, including a sea mount that rose from the depths of the Pacific to a hidden peak at a depth of ten feet.

Before I flew back to the mainland, I jumped at the chance to visit the neighboring island of Ofu. In the early morning darkness while being pelted by heavy tropical rains, I scrambled aboard a ferry and began the ten-hour journey to Ofu. During my brief, eighteen-hour visit to the island, I snorkeled on some amazing reefs within the park and rested on one of the most beautiful beaches I have ever seen.





I have often described this internship as a once-in-a-lifetime experience, but that description actually falls short; this has been a *collection* of once-in-a-lifetime experiences that have taken place in locations as diverse and incredible as the people who made them possible. Every individual leg of this journey has shown me a beautiful part of our nation and a family of hardworking, talented National Park Service employees. I am so grateful that I was quickly and consistently welcomed into this family everywhere I went. From frosty, mountainous lakes to lush tropical islands, this internship has shown me places and people that make me proud to call the United States my home. I want to give a massive thank you to those incredible people at every park, the Our World-Underwater Scholarship Society for helping to create this dream internship and larger network of passionate divers, and every single member of the Submerged Resources Center, who allowed me to proudly share their unit's name throughout these travels.

Offering thanks is a great first step for someone who has been provided such a bounty of mentorship and experience, but of course it can't end there. As I figure out the exact road ahead of me, I know that I'll be repaying this opportunity throughout a lifetime of preserving our nation's underwater resources and passing along the collected wisdom of countless mentors. Thank you all so much!



ACKNOWLEDGEMENTS

I am still in disbelief that this internship even exists; for that I cannot offer enough thanks to the Our World-Underwater Scholarship Society and the Submerged Resources Center. The financial support from the National Park Service has provided me with one of the most influential and truly satisfying experiences of my life. Additionally, this internship could not be possible without the massive efforts of people who contribute out of belief in the mission of the OWUSS and the NPS; internship coordinators, incredibly welcoming Park Service employees, and spare-couch-providers alike. I owe a special thanks to George Wozencraft and Martha Sanders of OWUSS and the SRC's Dave Conlin, Brett Seymour, and Sami Seeb for their fantastic support and guidance.