

Our World-Underwater Scholarship Society

Aquarena Internship Final Report.

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My time spent at the Aquarena center in San Marcos, Texas was an adventure I will hold with me for a lifetime.

After an exhausting week of studying for finals I departed from the gates of Eckerd College in St. Petersburg, Florida on Thursday, May 20th at 10pm. With a cooler full of red bull, an Ipod full of music, I was Texas bound with the goal of arriving Friday afternoon to prepare for work at the Aquarena Center. Having never visited the Western United States I was eager to arrive and explore all that Texas had to offer.

History

The Edwards aquifer is a karst limestone structure which runs from Brackettville in the west to Austin in the north. The aquifer provides water to more than two million Texas residents. The Balcones fault zone, which runs from Del Rio to Waco, parallel to I-35, separates the Texas hill country and the coastal flood plains. This geological formation forms fissures, allowing the crystal clear, naturally filtered water to flow through the earths crust forming springs, which feed the numerous rivers of central Texas such as the San Marcos and Guadalupe.

In 1849 General Edward Burleson, a civil war hero and former vice president of Texas, built an earthen dam which formed what is now Spring Lake. Spring Lake is now the location of the Aquarena Center. Historically, the spillway was used to power a gristmill.

In the 1926 a gentleman by the name of A.B. Rodgers bought Burleson's land. Upon it he built a hotel on the bank of the springs and marketed it as a spa, complete with swimming pool. In 1949 Paul Rodgers, his son, purchased the area and started "Aquarena Springs" complete with an underwater submersible theater, a swimming pig named Ralph, and "Mermaids", performers who would perform, eat and drink underwater. The Mermaids were similar to those who still perform at Wiki Wachee springs in Florida and were trained by the same individuals. Replicas of Edward Burleson's cabin and a Spanish mission, which was found to be present on the land in the past were built and included in the attractions offered at "Texas's first theme park".

In 1972 Dr. Jouel Shiner started excavating a portion of Spring Lake. The specific sample area was hypothesized to be a former river

bank that existed before the creation of the lake. Here were found many artifacts-- ranging from aluminum cans from the original theme park, to Clovis points and arrow heads. The name "Clovis" is not the name of a particular tribe but instead refers to tribes of a certain time period of which the first artifacts were found in Clovis, New Mexico.

Data from the underwater archaeological site informed the researchers that this location is the longest inhabited location in central Texas, and perhaps North America. The site is still maintained by divers today as a historical area and is often part of the glass bottom boat tours.

A little about my time here

My time at the Aquarena Center was split between giving tours of the springs, volunteering with local organizations, and performing "aquatic maintenance." The boats in use at the Aquarena are "home made" in nature and consist of a flat pontoon boat with a hole cut in the floor surrounded by a viewing well and benches on either side of the enclosed structure. The boats are kept in the original style, having been updated and maintained through the years. Updates include

switching from gas engines to more environmentally sensitive electric engines and transforming boat number one into a summer boat, complete with a classic canopy, which allowed for better air flow.

Tours

While some of the other boat drivers make the process look effortless, it took me a fair amount of time to master the art of controlling the floating rectangle. The flat bottom of the hull, combined with 6x15 side panels, allows even the slightest wind to blow one off-course. Secondly, driving boats is nothing like driving a car. Having no prior experience with boats made this a true learning experience. During my training with Page Moore, the boat manager, my fishtailing diminished in intensity and my ability to hover over springs and slow my momentum improved. As a rule with these boats any action of the rudder or thrust takes at least 3 seconds to take effect. I believe that my work with the boats helped me improve my forethought and contemplate my actions more thoroughly.

My Tour experience also helped improve my public speaking skills. Before my arrival I was a bit nervous about the tour aspect of the internship. While giving presentations I typically trip over my words while my cognition and articulation run at opposing speeds--with all knowledge of the topic trying to exit my mind at once. I was quick to learn the required information, including: what formed the springs; the history of the structures on the banks of the lake; and of course flora and fauna identification with a few fun facts and information about the endangered species. After a few practice tours I was finally ready to do my first public tour.

Over all it went well. Children were my favorite audience; to them at that moment you are the coolest person in the world. Point out a turtle and a few fish and you have their undivided attention. Their inquisitiveness helps to move the tour along, often pointing out items the driver could miss while trying to control the boat.

Volunteering

While at Aquarena I had the opportunity to volunteer with U.S. Fish and Wildlife at the National Fish Hatchery and Technology Center, located in San Marcos. I met with Patricia Grant, a Biological

Science Technician and Region 2 SCUBA Diver, who gave me a quick tour of the facility and introduced me to the various organisms present at the hatchery.

This particular facility currently has a captive breeding program for various species of salamander including the endangered Texas Blind Salamander and San Marcos Salamander. They also raise a few species of fountain darters, one of which is on the endangered species list. The organisms reared at the center are used for research and conservation purposes. They are used to determine the effects of various environmental cues such as light and temperature on their biological systems as well as to replenish the population if an environmental disaster ever occurs and wipes out the wild population. The center also raises Texas wild rice, which they germinate and attempt to reintroduce into the wild.

After my tour I was given various tasks to complete throughout the day. I made screen drain covers, which would cover the outlet pipe of approximately 6 new tank set ups that were being prepared for juvenile salamanders. The covers are simply made of plastic screen and hot glue but ensure that the small inch long salamanders

do not escape in the circulating water. My next task was to feed the salamanders, which happens three times a week. Each of the larger tanks gets a liquid slurry of fish flakes and a small portion of black worms which are small threadlike worms which clump together in mass when undisturbed. While the black worms are meant for the salamanders the fish flakes are intended to feed the many snails in each tank. These snails act as both cleaners, keeping the algae in the tanks in check, but also as high protein snack for the salamanders between feedings.

After lunch I went around to the mature salamander tanks and collected eggs laid in the vegetation. Only one tank had laid eggs, and oddly enough it was the quarantine tank, where they keep sick and injured salamanders. Because all the tanks in the facility were full, Patricia was not interested in rearing the eggs to maturity. Using a pipette I sucked each quarter inch in diameter egg and transferred it to a vial containing ethanol for preservation. They save all the eggs for genetic research. I ended the day by collecting amphipods in the out side runs where the wild rice is kept. These would later be fed to the smaller salamanders, along with pieces of black worm.

Later that week I had the privileged to work with Randy Gibson, also with Fish and Wildlife. Randy specializes in entomology and has a project near spring island, part of the Landa lake - Comal springs system located in New Braunfels, TX. About once a month Randy leads a small group that find preset "traps", which are essentially balled up pieces of cloth buried within the spring. These pieces of cloth collect algae and bacteria, which in turn attract bugs such as the riffle beetle, a pinhead sized organism, and its larva. Peck's cave amphipod also sometimes get trapped in the cloth, having been blown out of the aquifer by the spring flow.

The day of my visit was a special expedition due to flooding which took place during a storm the week before. The storm, which had dropped 11 inches of rain on the area in an hour, caused massive flash flooding and even left one dead, had disabled the sewage treatment plant and made the Comal river unsafe to swim for a period of time. The field site had gone drastic topographical changes, so finding the traps was proving difficult since some had been washed away, or buried in sediment. Despite this fact, 21 out of a total 33 were found.

After assisting in the locating of the traps via intersecting pre-flood transect measurements from fixed points on land, the rest of the day was spent cleaning up flood debris. The previously crystal clear water and algae covered bottom of the spring had been transformed into a murky, rocky pool filled with hazards. Among the relics corrugated metal used for roofing, barbed wire, cans of paint, and a wet/dry vac were the more notable items pulled out of the water that day, along with countless aluminum cans and pieces of PVC piping. From the content of the debris we surmised that a utility shed had been washed away, leaving its contents at the bottom of the Comal.

My third day spent away from the Aquarena was to perform work in the rivers surrounding Landa park. The project consisted of surveying the concentration of parasites in the lake. This particular parasite utilizes many different hosts during its life cycle, including various birds and a certain invasive fresh water snail. During one of its developmental stages it implants its self in the gills of a fish, the issue with this is that if enough of the parasite implant them selves in a host it severely damages the gills and inhibits the organism' gas exchange capabilities. Since these water systems are inhabited by

known endangered species such as the fountain darter, which is especially susceptible due to its small size, Fish and Wildlife find it most prudent to monitor the concentration of parasites in the water.

We visited three locations. At each one a transect line was laid and data was taken every two feet. At each location water samples, flow rates, and light readings were taken at three different levels in the water column. The water samples were filtered using a gravity filtration method and glass fiber filters. The used filter for each sample was then dyed with a pink dye and sealed in a petri dish and labeled for further analysis back at the lab.

Underwater guarding

While at Aquarena I had the pleasure of working with Aaron Wallendorf and Taylor Heard, the two main employees in charge of maintaining the springs and other facilities around the park. My diving oriented responsibilities consisted of filling tanks from the air banks, being “scuba cop” on the weekends and maintaining the overall visual appeal of the springs.

If left alone, the lake vegetation would completely cover the springs, obstructing the view from the glass bottom boats. As part of

this team we would go in and clear masses of aquatic vegetation from around the springs and other sites of interest. The favorite method consisted of trimming the plants with a machete before using a sea-doo diver propulsion vehicle as a leaf blower to blow it off the bottom and to the surface where Taylor would later pick it up with a floating machine called a harvester.

I also assisted with technical duties such as inserting an EPA Sond into the spring known as “Johnny Wisemuller”, and changing out the “bugs”. The sond, which resembles a 2.5 ft long gray tube, collects information on different water schematics such as conductivity and ph. The “bugs” are packages of coconut charcoal placed in the springs to collect dyes injected at various reuptake locations in the central Texas region. These instruments are vital to determining where water is coming from, and how long before it reaches the Edwards aquifer and flows out of the springs. This information could help to determine the level of protection an area receives from harsh chemicals and other pollutants such as sediment runoff from building sites.

One of my more physically demanding tasks was to assist in the removal of a large tree that had fallen in to the lake and was blocking a large high pressure spring. We started by trimming off branches to make the log easier to transport. Before we could drag it to shore, a bottom branch, which was supporting the weight of the downed tree had to be cut off. This was accomplished by first attaching a 500lb lift bag to the tree to support it after the branch had been severed then a team of divers including Aaron and my self descended and took turns sawing through the 7inch in diameter limb. After the log was freed it was drug to shore by Taylor Heard, my self and Justin Payne, a fellow boat driver.

On weekends I served as "Scuba Cop". It was my job to make sure all open water divers doing their check out dives were signed in and paid for. Although not the most difficult job in the world there were some subtleties one needed to pick up on. One was the fact that all dive masters were supposed to pay prior to the dive; however, many would wait until the end of their session. This made determining who had paid and who had not at times a challenge, but

by my second shift I knew a good deal of the dive masters by name which made identifying much easier.

Through my time spent at the Aquarena and the surrounding area of San Marcos I was introduced to many new experiences. When not working, I took the opportunity to explore both Austin and San Antonio, along with many of the local tourist attractions and state parks. One of my favorite spots is Guadalupe Mountain state park, where we hiked the highest peak in Texas. After leaving Texas, we explored New Mexico, Oklahoma, and Arkansas before returning home to the New York/ New Jersey area. For these opportunities I am eternally grateful and would like to thank Ron Coley and Aaron Wallendorf at the Aquarena for their help and support, as well as the Our World-Underwater Scholarship Society for sponsoring the internship.



Figure 1. The Texas Blind Salamander at National Fish Hatchery and Technology Center.



Figure 2. A hand full of Black Worms used to feed the salamanders. They were placed in a bucket with water and each serving was dispensed via turkey baster to each tank.



Figure 3. At The National Fish Hatchery and Technology Center most of their salamanders were held in an out building, which housed rows of various sized tanks.



Figure 4. Glass bottom boats at the docking area.