Without water, life as we know it would and could not exist; it is an extremely important part of every person's daily life. Those who are fortunate enough to live in Florida are exceptionally lucky. Florida is surrounded by water, contains thousands of lakes, and includes millions of acres of delicate wetlands. Although there is a great quantity of water in the state, water management is essential for Florida's future. Water management is needed mainly because tropical weather varies seasonally. Florida has survived numerous devastating hurricanes that have caused severe flooding and Florida has also experienced many droughts.

Without water management, precious wetlands and water resources would be depleted completely or destroyed by pollution. During Florida's first one hundred years as a state, water management consisted of draining wetlands for agricultural and residential use, and attempting to make these regions safe from flooding. However, the drainage systems that were used did not function properly resulting in dangerous flooding during hurricanes and the loss of the lives. In 1957, the Legislature created the Florida Department of Water Resources granting them the obligations to regulate permitting of water withdrawal, the use of excess surface and groundwater, and water conservation. In 1972, the Water Resources Act created five water management districts of Florida. Since water flows freely from one political region to the next, the districts' borders were based on watersheds instead of political boundaries. The districts' borders were finalized in 1976. This same year, Florida citizens voted to accept that the districts would be funded through property taxes.

Since it's creation in 1972, the Water Resources Act has been changed often, resulting in greater workloads for individual water management districts. Today, the responsibilities of the districts include "buying land to manage water resources, permitting the use of water, assisting local governments in planning, developing of inventories of available groundwater, plugging free-flowing artesian wells, permitting storm-water programs,

and reviewing “developments of regional impact” (Florida’s Water Guardians pamphlet).” The districts are responsible for deciding water needs for the safety of the environment which is accomplished by providing protection and assisting in enhancement of natural systems through different land and water resource management programs. The districts are also responsible for assigning water for public consumption, agriculture, power generation, commercial purposes and mining; providing flood security; and enhancing water quality.

The Northwest Florida Water Management District (NWFWMD) is the district that I work for. This district extends from the St. Marks River Basin to the Perdido River and contains sixteen counties. The NWFWMD headquarters are located west of Tallahassee in Havana, Florida. This district regulates twenty-one percent of Florida’s land cover. Resource management, the department that I work in, plays an essential role in water management. Quite a few programs are executed through the resource management department including storm-water monitoring, surface and ground water quality monitoring, and the Surface Water Improvement and Management (SWIM) Program.

The SWIM Program is one of the most notable resource management programs implemented at NWFWMD. This program started in 1987 and identifies water bodies that need to be protected or restored. Everything is measured at these sites including water quality, quantity, and overall management of the system. Some locations where the SWIM program has been implemented include the Apalachicola River and Bay, Lake Jackson, the Pensacola Bay System, the St. Marks and Wakulla River System, and the Choctawhatchee River and Bay.

The Apalachicola River and Bay has been the focus of numerous research and restoration efforts because of the SWIM Program. The District has been playing an active role in the Apalachicola-Chattahoochee-Flint (ACF) River Basin Compact negotiations which includes the states of Florida, Georgia, and Alabama. For about ten years now, these three states have been in the process of creating a reallocation agreement for fairly sharing the rivers’ waters while protecting the water quality, ecology and biodiversity of the system. The ACF has been a

SWIM Program issue because of the concern of the effects on the environment of less water reaching the Apalachicola Bay. Disputes have been continuing since the ACF Compact Agreement became a law in November 1997 which allowed Georgia to withdraw more water for the growth of Atlanta.

To help prepare for these disputes and negotiations, a large amount of research was conducted. The district's chief priority was to make sure that the Apalachicola River and Bay's uniqueness and productiveness would be protected and preserved. The demands and impacts on the entire ACF system needed to be studied closely. Therefore, the historical as well as present flows of the rivers were studied and compared daily, monthly, seasonal, and annual levels. For the resource management division of the district, I took water data from the Internet and other environmental scientists and input the data through models to see if the flow levels were high enough to support life in the ACF river basins.

Along with these water quantity assessments, water quality is also monitored. Fresh water requirements were defined to continue biological health in the rivers and their basins. For this project, I searched the Internet for information regarding contaminants that entered the Apalachicola River through non-point and other small sources located in streams and creeks that flow into the larger river systems.

Information was difficult to locate because many state and federal organizations were unwilling to put a huge amount of data on the web for public use. I had to piece together information from many sites in order to get the overall picture. I prepared a small report for Ron Bartel, the division head (my boss), with this information. For each source that I was able to find information on, I created a map with GIS using mainly the latitude and longitude points to locate the sites.

Finding the GIS layers online proved to be the most difficult of this project. My boss wanted a map that was divided into hydrological units and the smaller watersheds. The smaller watersheds were extremely difficult to locate. I relied heavily on a person in the GIS department who had connections with U.S. Geological Survey to help me find a map with these layers on it. Once I received the layer, the actual mapping was easy to accomplish.

Another SWIM Program project that I worked on involved the Choctawhatchee River and Bay watershed. The Choctawhatchee River is the fourth largest in Florida in discharge and drainage area. The Choctawhatchee River and Bay system includes a large diversity of ecosystems including estuarine, freshwater, wetland, and upland ecosystems. These resources support several plant and animal species and provide many human benefits. The estuarine system provides commercial and recreational fisheries, recreational opportunities, aesthetic quality, economic benefits, and a generally high quality of life.

Although the ecology of the Choctawhatchee River and Bay system remains generally intact, widespread non-point source pollution and land development have resulted in substantial habitat loss, water quality impairment, and other impacts. Growth within the lower portion of the watershed in the past decade has been particularly rapid leading to extensive wetland habitat alteration and loss. As a result of the growth, many wetlands dredge and fill permit applications are processed by the Florida Department of Environmental Protection (DEP) and U.S. Army Corps of Engineers (COE). Most of these wetland impacts are proposed to facilitate residential and commercial developments that range in size from single units less than an acre in size to large "new town" developments. The final permits frequently include mitigation requirements. Mitigation is the planned improvement of an area of wetlands. Such mitigation is often accomplished through conservation easements and deed restrictions, with the property remaining in private ownership.

My task on this particular project was to describe and evaluate the success of wetland mitigation. For this project, I conducted a large amount of research to review state and federal regulatory and resource management agencies and their guidelines for wetland mitigation. After the research was complete, we began reviewing the permits. Each permit was unique and varied in content. The permits were divided amongst the Chief of the Environmental Resource and Planning Bureau, an Environmental Scientist, an Associate Water Resource Planner, and me, a student. They each had about one hundred permits to review where I had about 150 because I had more time to dedicate to the project. The evaluation of the mitigation requires identification of how many acres of

mitigation have been established, how well these lands are managed, the overall success rate of these actions, and how well mitigation goals are being met. To accomplish this, areas and types of permitted wetland impacts were put into a table and mapped. Assigned mitigation actions were also tabulated and mapped by wetland type and mitigation category (creation, restoration, preservation, etc.). To help evaluate the results, mitigation goals and criteria established by regulatory and other resource management agencies will be identified and applied in future work.

Numerous meetings were held for the four of us to meet and discuss ideas and problems. Some common problems included the size of the area. Some wetlands were so small that it was complicated to find its exact location and to map it in the correct shape and size. The latitude and longitude points that were given were off for many sites. Some sites had a combination of impacts but could only be mapped as one type. In order to map these difficult sites, I had to rely on multiple paper maps to find the exact locations of the impact areas. Many permits contained topographic maps to help locate the impact sites while others only contained words describing distances from different landmarks. The most complicated sites to digitize were the ones that contained hand-drawn maps that were not drawn to scale and had approximate locations of the sites. With the help of the GIS department, I quickly learned how to find small clues that would help me find the sites easily.

The methods we employed will be directly applicable throughout all of northwest Florida. These methods should also be applicable elsewhere, where wetland impacts are permitted based on requirements for most mitigation actions. This project will provide an improved understanding of the relative scales of wetland resource loss and protection in the watershed. This project also enables resource management agencies to more efficiently and effectively manage wetland protection and mitigation activities and monitor impacts and mitigation. This will help to minimize actual impacts and help to prioritize areas and wetland types for protection and mitigation.

I enjoyed working on this project tremendously. Having used Excel in Computer Literacy, Environmental Field Methods, and Spatial Data Analysis helped me greatly. My Intro to GIS class helped me become familiar

with GIS. Unfortunately, the district uses different software than the school but I was able to quickly pick up on it and now feel more comfortable using this software than the ArcGIS at Florida State. The Environmental Field Methods class and my geology class also helped me because I learned how to read maps in these classes.

Another project that I worked on while working at the district was funded by the Florida Department of Transportation (FDOT). In December of 2001, the Efficient Transportation Decision Making (ETDM) Process was accepted by the Northwest Florida Water Management District, FDOT, and twenty-two other transportation, environmental resource, and regulatory agencies in the state of Florida. The goal of this process is to "improve transportation decision making in a way that protects our natural and human environmental resources (ETDM website)." This new approach involves active participation of Federal, State, and local agencies, and the public.

For this process to be successful, an Environmental Technical Advisory Team (ETAT) was created for each of the seven Florida Department of Transportation districts. Mr. Bartel was appointed the ETAT representative for NWFWMD. He is responsible for coordinating and meeting with other ETAT members and for making sure the project evaluations, reviews, and screenings are completed in a timely manner.

A meeting was scheduled for all the representatives to meet and discuss their progress and to brainstorm ideas for the process. Unfortunately, my boss was unable to attend; however, he sent me in his place. I was extremely grateful to be given the opportunity to meet with other agencies that can offer possible future job opportunities for me. Of course, I did not give my opinion at the meeting; I only took notes and met the people present. After the meeting, I reported back to Mr. Bartel with what I had learned. He then asked me to get in contact with a few of the ETAT representatives and coordinators regarding upcoming reports that were due.

I have also played an active role in brainstorming and revising the documents pertaining to this project. With the supervision of the division head, I modified the Task Group Report and added a new section regarding funding. This report is basically a contract between NWFWMD and FDOT stating what the district's

responsibilities are and how FDOT will pay for them. In addition to amending these reports, I have access to the ETDM website that is confidential and only for representative to use.

Right now, we are in the planning screening point of the ETDM process. In the near future, we will begin GIS work for the long-range transportation plan. This is only the beginning of a long process that unfortunately I will not be able to experience working on because my job ends in December when I graduate.

I feel this project relates mainly to my Intro to GIS class only because it involves GIS work. All classes involve writing and reviewing reports. However, going to meetings is a huge job related responsibility and I wish there was a class available to take that teaches proper etiquette and business meeting skills. I feel I learned more from being the president of my sorority by dealing with contracts and going to meetings as a representative of that than from any of my classes.

If I am not working hard on another project, I will get to help with the Surface Water Division of Resource Management with ambient monitoring. Over the past nine years the district along with DEP has assisted in an ambient surface water quality assessment program. This program provides surface water quality data for the evaluation of long-term water quality tendencies and impacts from particular activities in watersheds. These data are used by the district and DEP to create management plans that will enhance surface water quality or reduce harmful impacts on surface water resources. Twenty-four surface water sites are sampled for water quality monthly. This project is funded by a grant from the EPA that was given to the district for the purpose of monitoring and improving surface water quality throughout Florida.

The district also monitors other surface and ground water sites for DEP. This monitoring project has been continuing for seventeen years. The district collects and interprets water quality data from different types of aquifers, rivers, streams, and lakes as part of a statewide water resource monitoring network for DEP.

For this project, I went to Pensacola for two days to take measurements from a remote site where sand is dredged and sold as fill. The areas that had been excavated were filled with water from groundwater seepage and

storm water runoff. At this site, there are numerous places where measurements are taken. We first inspected the area and located all the points where data would be collect. We also surveyed the site and marked the level of each well in comparison to sea level. We took a GPS reading for each well to help with mapping the area later on.

Surface water measurements were the easiest to calculate. A white yardstick was permanently placed in the water so data could be collected on a regular basis. To find out the level of the water, I first took a note of the entire height of the stick (usually ten feet) and subtracted the number indicating the water level. To see this number accurately, I had to be at the level of the water without disturbing it.

Groundwater measurements proved to be slightly harder to obtain than the surface water measurements. Groundwater is measured through wells that go into an aquifer. Each well is locked and has a pressure plug on it to discourage vandalism. Most wells also have a metal manhole cover over them that also must be removed. I used two different instruments to measure the wells. The first day, I used a steel measuring tape. First, I covered the tape in blue chalk and then lowered it to a constant number down the well. For my number, I used 78 feet. After lowering the tape carefully down the well, I had to quickly remove it. If I did it slowly, the water would evaporate and I would not be able to locate the level of the water on the tape. On the second day, I was fortunate to use the electric measuring tape. When this tape touches water, it beeps. It is a lot easier, cleaner to handle than the steel tape, and more accurate. Every fifteen minutes, I measured two wells to see if the aquifer was being pumped or not. The water level kept dropping proving that the aquifer was being pumped.

Another employee took the surface water samples from the site. He checked the pH, temperature, salinity, dissolved oxygen content, and conductivity of the water at different levels of depth at the site. The samples he collected were iced right away and brought back to the district field lab office.

I am responsible for taking these types of samples to the DEP lab on Blairstone Road. There, the samples are analyzed for different chemical and biological parameters. Parameters that are measured include coliform,

nitrogen, dissolved solids, and phosphorus content. The results are then sent back to the district where I enter them into a database for future references. The scientists then analyze the data and create reports regarding the sites.

Delivering the samples and entering the data into the databases are my "busywork" assignments. The data I deal with is important yet students are the ones who enter the data into databases and deliver the samples because they are simple tasks to complete.

My Environmental Field Methods class helped prepare me the most for the field. In this class, I learned how to use a GPS and some basic surveying techniques. The only other class that I had where we actually went into the field was geology. In that class I became familiar with the tools used to measure water resources.

Interning at the Northwest Florida Water Management District has been a great experience for me. Not only have I been able to use what I have learned in the classroom in a professional setting, but I have also been educated by the overall experience of working here. The staff is understanding of students and does not simply hand out a task to do without explaining what it is and what it is for. My knowledge of current issues involving the environment has grown tremendously because I have encountered the issues first hand. I have also learned professional etiquette which is important to have once in the "real world." The environment the district provides is very professional yet relaxed. If I had completed my work for the day, I felt comfortable enough to walk into other parts of the district and talk to other employees about their occupations and experiences. I would definitely recommend this internship to any student. Not only is it a great internship, but it is also a paid OPS position that I can use as experience on my resume.