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GISCorps at Hurricane Katrina:
Realizing the Fantasy of High Technology

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Abstract:

Two weeks after Hurricane Katrina hit the coast of Mississippi and Louisiana, I was called by GISCorps to help. After a briefing in Jackson, I was deployed to Wiggins, Mississippi, which is about 35 miles from the coast. Here, there was a lot of damage from wind and fallen trees. During our stay, FEMA and the Army Corps of Engineers came and made the depot their headquarters. We were able to help them navigate the county and find where the damage was. With the GIS information we had, we were able to send them to locations where there were people who needed the most help first. Overall in a disaster situation, it is important to realize at what capacity you have to work with in terms of facilities, people, and level of need when leveraging a GIS system. This paper will cover my experience and what I learned.

Body:

GISCorps is a volunteer organization that operates under Urban and Regional Information Systems Association (URISA), which provides GIS services to underprivileged communities. GISCorps was asked to help with the aftermath of Hurricane Katrina by sending volunteers down to the coast. I was one of the volunteers chosen to help out. The full experience I had there is difficult to describe, but it is something I want to remember and share with other people. There was something to be learned from the experience, and it was not cool or fancy GIS work. What I did learn was that quick and simple GIS was the best way to help.

I volunteered for GISCorps in 2004. At that time I thought the chances were pretty slim that I would ever be chosen to go to a different country to do GIS work since I do not speak a foreign language or have experience in world travel or skills with foreign affairs. But a few days after Katrina I got an e-mail asking me to send in my resume to volunteer for the hurricane relief effort. I was very excited and responded right away. I thought this was something exciting I could do that would get me out of my comfortable but somewhat mundane routine. I wasn't selected in the first round, but in the second round I was called to go. I flew out to Jackson, Mississippi the next day, not knowing what location I would be "deployed" to. During my five-hour layover in Atlanta I had plenty of time to watch CNN and see what was going on at the coast. I couldn't believe I had volunteered to be anywhere near this disaster area!

I arrived at the Jackson airport where I met up with Lucia Barbato, a GISCorps volunteer and the Associate Director of Geospatial Technologies at Texas Tech University, with whom I was to spend the next week. Lucia and I were transported over to our hotel, where we were confused and surprised to find that we would be sharing a

room with a man named John from Fayetteville, Arkansas, whom we had just met. There were no hotel rooms to be had within many miles of this area and we were lucky to have this one to share. I mentioned to Lucia that we should be prepared for whatever lay ahead, and that we might not have a hotel room where we ended up. We didn't know that these were the last actual beds we would see all week.

The next morning we got up, watched more CNN, and ate our continental breakfast. We were soon transported to the Jackson Emergency Operations Center (EOC) where the "brain bus" was located. I had already seen this on the GISCorps Web site, so in my mind this was the location that I would be working in. Once I saw it in person, that's when I knew I had arrived!

1. The "brain bus" camper owned by MSU (Barbato).

This was a camper owned by Mississippi State University (MSU) that was decked out with 12 computer workstations. Painted on the outside was "Mississippi Global Education Mobile" (ESRI). We went inside and saw 5 or 6 people diligently working elbow to elbow. We didn't want to disturb them to introduce ourselves since they all looked like they were concentrating very hard. We waited there for our marching orders and, as we waited, looked around to see what was going on. Helicopters took off and landed right at the facility about every 10 minutes. The main EOC was the National Guard building under normal circumstances. Just inside the building and down the hall was a relatively small room that was the main command center, jam-packed with people, televisions, and computers.

2. The EOC at Jackson, MS (Barbato).

The hallway was filled with fascinating maps and illustrations of different aspects of the hurricane. The most unbelievable display was a before and after satellite photo of the coast of Biloxi, Mississippi. There were three casino boats labeled one through three docked at the shoreline in the “before” picture. The “after” photo showed those same numbered casino boats thrown an astonishing distance inland.

3. Map in the hallway at Jackson EOC showing before and after images of the coast of Biloxi (Barbato).

Soon we were gathered back outside at the brain bus and received instructions on where we would be going. Lucia and I were to go to Wiggins, Mississippi, which is 35

miles from the coast. I was somewhat relieved that we would not be going straight to the coast.

The three-hour drive to Wiggins did not seem quite that long with all the damaged scenery to look at. The intensity of the damage increased the farther south we traveled. In and around Wiggins we were seeing Category 3 damage on the Saffir-Simpson Hurricane Scale (NOAA). We stopped at one location just outside of Wiggins where we saw a church steeple still upright and attached to the roof, which was sitting on the ground. There we met the pastor's wife who showed us around. She told us she had met several people from all over the country who just stopped in like we had. We asked if she needed anything, but she said she had what she needed to survive (ice, water, food, etc.). She said that they had been without power for 15 days straight. Later we found out that the locations closer to town had power restored sooner that ones farther from town. She brought us into the church where the roof had been badly damaged. The smell of mold was so strong that I could only stay inside for about a minute. I thought it might be possible that I'd have an allergic reaction, so I waited for the others outside. It was an unbelievably strong smell – like nothing I had experienced before. I'm not sure how anyone could handle doing any repairs with that kind of stench.

4. Church steeple outside of Wiggins, MS (Carpenter).

Not long after we left the church, we entered Wiggins. Wiggins estimated 2003 population was 4,213. The first thing we saw coming into town was McDonald's and the mangled golden arches.

5. McDonalds in Wiggins (Barbato).

We drove down the main street and got a good look at the town where we were going to be working when we came upon the local train depot with half of the roof blown off. To our surprise, our driver slowed down and turned into the parking lot. We were shocked to discover that this depot was where we'd be staying.

6. View from inside Wiggins depot, looking at daylight (Barbato).

7. Wiggins depot with roof and tree damage (Barbato).

Lucia and I went into the depot and met two students from MSU, the volunteers whom we would be relieving. They had been there for several days and spent the next hour transferring two weeks of knowledge to us; some of this information was already degraded to second-hand knowledge from the two volunteers that were there before them. It was really frightening when the students got in the van and left with our driver. There we were, stranded in this half-destroyed building with no car, and we did not know anyone there. Unsure if we absorbed everything that was said, and feeling very alone, we

were on our own from that point on. We now took a moment to check out our surroundings.

We arrived in Wiggins 15 days after the hurricane. The water was not drinkable at this point, and would not be for several more days. We had a bathroom, but no shower. There was an air mattress and a regular mattress to sleep on. There was a small kitchen with a refrigerator, microwave, and stove. We had power, so if we could get to a grocery store we could get some food and have the ability to prepare it. I found out later that cell phone service was not working well. It seemed like local calls were mostly working, but the farther you drove outside of town, the worse it was. I was not able to receive calls on my cell phone from out of state until many days later. The internet was working sporadically; on some days we would have several hours without internet access. The back door of the building had been blown off and broken into two pieces.

8. Depot back door (Carpenter).

There was another door separating the two rooms of the depot. We took a broomstick and wedged it between the door handles to secure ourselves in at night. We had seen footage of the looting going on in New Orleans and were taking our precautions.

9. Barring the door for security (Carpenter).

This was the environment we had to work with. It took several days to really see what we were up against and get a feel for what we had to work with. It took that long to see exactly what we could do to help.

8. One of two laptops set up for GIS work (Barbato).

I worked on this laptop for nine days, right next to the door where people were going in and out all day long. There were thousands of “love bugs” swarming outside the door, which didn’t shut properly due to the storm. I think the extra door propped up in the corner and the lamp on the floor were remnants from the recent remodeling of the building. According to the guest registry, they had just had their grand opening the beginning of August. This building was normally used as the Stone County Economic Development Offices. The director who had his office there was the former mayor. He was working tirelessly as one of the major community leaders to help with organizing the recovery effort. His assistant was very accommodating and helped us with anything we needed. She also insisted that we take a break and go to lunch, and she drove us somewhere to eat every day. If she did not insist, I’m pretty sure that we would not have realized what time it was and would have easily forgotten to eat. We did forget to eat dinner a couple of times, which I would normally never do!

One of the first people we met was a woman who worked at the cooperative extension office who invited us to attend the town meeting that was being held nightly. She was helping to coordinate people and was part of the group of town leaders who were working on the relief effort. The meeting included the town mayor; Red Cross volunteers; the fire department, police, and other emergency officials; FEMA; and various town and county officials. Every night the meeting was different, and people who were involved in the effort came to receive direction or provide information on how the process of recovery was unfolding. Realizing how clean-up and repair operations were simply occurring and people were coming together randomly was probably the most fascinating part of this process of recovery. There were so many different stories of people’s harrowing circumstances, there were too many to recount. I began to realize how helpless everyone was and yet still amazingly resourceful. People came together to help each

other like never before. People's priorities were shifted from daily tasks to emergency mode. For example, Lucia and I were able to take rides from a woman who had a pickup truck with no side window on the passenger side. The window was blown out in the storm, and there were still shards of glass on the seat because she didn't have time to really clean it out properly. We just sat on the glass and were thankful to have a ride.

There was a church in town that acted as a center point to this particular community, and the pastor and his wife were instrumental in providing the community with basic needs right down to the individual level. Their own parsonage was filled with Army Corps of Engineers (ACOE) workers, among others. The church had a large room filled with supplies (water bottles, diapers, cleaning supplies, food, clothing, etc.) donated from various sources.

9. Church set up as a warehouse with extensive supplies (Carpenter).

Anyone who needed anything could come in and take what they needed. There were a few people who were taking supplies and returning them to Wal-Mart for money, but that was easily stopped by the volunteers marking out the UPS symbols with black marker and writing "disaster" on each item. The church also served free lunch and dinner to anyone who needed it. Those of us who were being paid or reimbursed were encouraged to shop at the local stores and restaurants to help recover the economic losses to the community. There were some restaurants open, although with limited fare. Fresh vegetables were hard to come by; they were getting a few shipments in, but deliveries in general were not reliable.

One of the biggest problems I saw with the relief effort was that relief workers were staying in hotels many miles from town. It took some workers two hours just to drive to Wiggins from their hotels. There did not seem to be any sense of urgency to optimize their time to get the work done. I saw this specifically with the ACOE and some

FEMA workers. These people are employed with an organization that requires them to work at disaster locations. I know they must have seen the tent cities popping up around town. I just didn't understand why they insisted on finding a hotel room at whatever distance, knowing the scale and urgency of the work to be done.

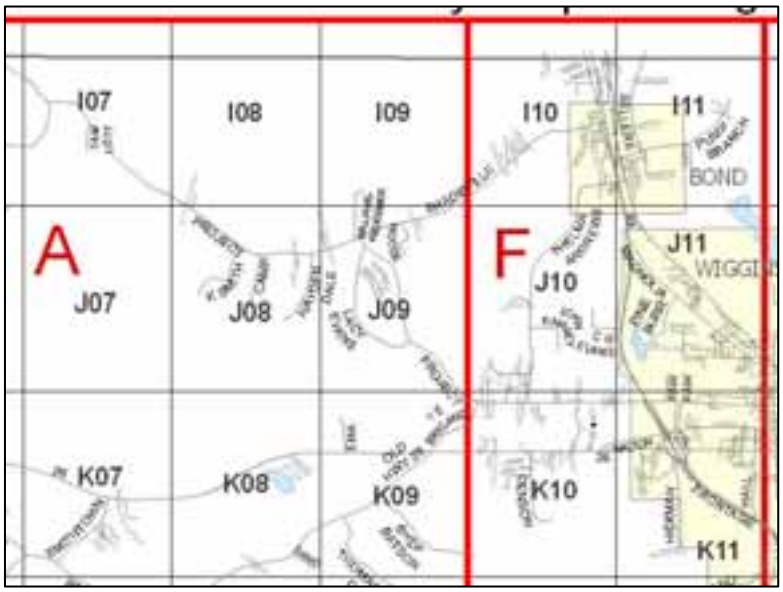
Eventually there was a FEMA team that set up camp in the depot at the end of the week. They had targeted the depot as one of the locations in town that could provide the facilities they needed. One of the FEMA team members asked me if they could set up their headquarters here, but I had no authority to make that kind of decision. I contacted the former mayor who had his office in the depot, but he was not answering his cell phone. I left a message saying that I was letting FEMA set up their headquarters at the depot and that he should contact me if that was not okay. I didn't see how it could be a problem and I wasn't going to turn them away. It seemed like once FEMA determined the extent of the work that needed to be done, they sent out teams to find a place to set up. As the media reported, it took a lot longer than expected. For that matter, everything took longer and was more difficult than expected.

Other problems we ran into involved privacy issues. FEMA and the ACOE were not able to share some types of information, like addresses, between agencies even though it would have optimized time and effort to do so. Both agencies were collecting information from citizens so that they could provide services to them. The ACOE set up a site at Wal-Mart so that people could sign up for the "Blue Roof" program. A blue roof is a temporary construction made of a sturdy blue tarp that is fastened to a damaged roof in a way that ensures that moisture is sealed out of the structure. This type of construction is designed to last a year or more, unlike what a homeowner could do with other materials. Those same people who signed up for a blue roof probably also needed to sign up with FEMA for assistance, but to get help from FEMA people had to go online, or call an 800 number that was impossible to get through, or visit a disaster recovery center (DRC) site (FEMA).

People who needed help could go to the library where they could use a computer to sign up for FEMA assistance online. There were volunteers at the library to help people who were not computer literate. Even with this assistance available, I heard that there were quite a few people in this area who were not able to use a computer to get the help they needed. Those who had transportation could visit a DRC site, but many people lost their vehicles in the storm due to water damage or trees falling on them, and did not have the mobility to visit the DRC sites. Given the overall situation, it was quite difficult to get help in general, since there was not reliable phone service, internet service, or transportation in the area. Just a simple observation: it would have saved people some time and effort if FEMA and the ACOE were able to coordinate, since those agencies were collecting similar information.

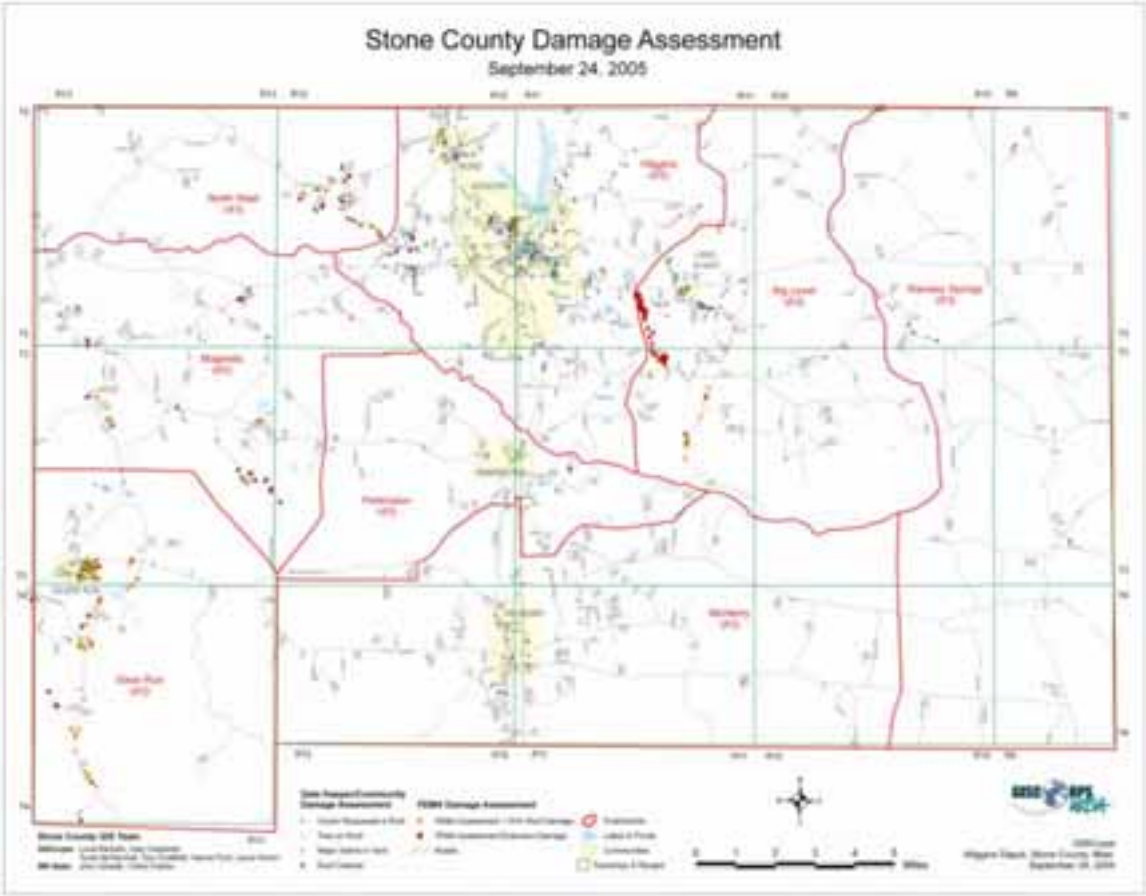
It took some convincing because of the privacy issues, but we were able to get address information from ACOE so that we could save them some time. What Lucia and I were able to do for the ACOE was correlate the address locations they would be visiting to a grid system we had set up on the county map. I divided the county into six evenly

divided sections. I delineated the sections based on the density of streets in each location, which was a loose indicator of the population density in that area. The sections around town were smaller than the outlying areas, so there was a high probability of having similar amounts of addresses in each section. I geocoded each of the addresses the ACOE teams would be visiting the next day, assigned a section to each geocoded address, and then had the addresses collated into piles for each section so that they were ready to go out to the field for the next day.



10. Map with grid used to organize site visits into smaller sections (Barbato).

In the morning, each ACOE team member was given a section and the related pile of addresses to cover for that day. This prevented the problem of each team member driving all over the county. The FEMA and ACOE teams were not from the area so they were not able to navigate as quickly and easily as someone who lived there. The team members were given street maps that they could read in the car to help navigate the county.



11. Map that FEMA used to organize site visits based on fire district and damage intensity (Barbato).

FEMA used the fire districts to evenly distribute their team members since they were also visiting damage sites. Lucia and I made a map that showed the Stone County fire districts and overlaid the geocoded damage points. Based on those fire districts, Lucia also created reports out of Access that allowed the FEMA captain to analyze the damage information more specifically.

The damage map helped us to communicate our purpose at our nightly meeting at the county court house. Up to this point we had been feebly describing how we could help, without much reaction. It was difficult to communicate what GIS could do when Lucia and I were just beginning to understand what the community needed ourselves. Once we showed people the information we had collected in the form of a map, the group began to understand what we had been talking about at previous meetings. After one of these meetings, the mayor asked me to explain more about the software and what it would take to get something running to produce this type of information. This community did not have GIS, and the mayor was suddenly very interested in what it was that we were doing.

Later in the week we ran into one of the judges in town; someone we were with knew her, so we all had lunch together. During our conversation, the judge said

something like “What’s GIS?” and “Why would anyone need maps?” Lucia was very patient and did not act surprised that a highly educated person such as a judge would not know or understand this concept. While I was busy scarfing down a shrimp po-boy the size of my forearm, Lucia continued to explain what GIS is and why people need it in a disaster situation.

One thing I should point out is that we did not have a lot of time to produce anything fancy. We had just enough time and data to throw some simple information onto some maps, but that happened to be the most effective use of our time and information. It was very important to be able to communicate to the FEMA and ACOE teams what we could do and also what we could not do. The hardest reality was that the damage information we had was not being updated. People were clearing trees and fixing power lines faster than we could gather the initial round of information, let alone go back to the field for an update. Yet, ironically, the largest need among all agencies, contractors, and relief workers was to know where the worst damage was located.

Something that was realized quickly, even before we arrived, was that a GPS collection method was not something that would be effective in gathering information in this environment. The community did not already have a good GIS base other than the E-911 street centerline file, so they did not have the manpower or data and software infrastructure to take something like that and pick up and go quickly. However, the community was able to use the resources available, like the postal workers who had to deliver the mail regardless of the weather. They were able to take a quick assessment of the situation at each location on their route and report that information back to be entered into the database. Thus we had information about the condition of the people and not just the condition of the buildings. The information we had from the postal workers actually did serve to get help first to those who needed it most, once FEMA obtained the information.

We were wishing we had post-storm imagery, and were told that we might be able to get it. There were some GISCorps people at the Jackson EOC trying to find it. We realized quickly that the post-storm imagery data was not something that just appeared on the internet overnight. I’m sure there were people working frantically trying to process the data for distribution. It was humbling that many of us working here as GIS professionals just didn’t understand the kind of time and man hours it took to obtain something like that in a useable form. The post-storm imagery would have provided a great source of knowledge of where the damage was and where it was the most severe. Without it we had to rely on other information and methods to obtain it.

Another interesting fact was that no one from FEMA or ACOE had a computer at all. I was wondering if any of them would have used one if they had one, anyway. At one point the FEMA captain was using a highlighter and a list we printed out to assemble a different list. We had to approach him and tell him that we could make a different list based on the criteria he needed. He was surprised, and at that point began to understand what we could do to help.

FEMA and ACOE, from my perspective, could have leveraged the use of technology. They probably don't rely on these types of tools because the locations they go to are without power and internet, but for them to be there without a laptop or anything was surprising to me. The ACOE used paper forms to collect information. If those forms were lost or damaged, there would be no way to recover that information. Those forms were the only source of collected information until they were physically transported to the headquarters and entered into a computer there. I believe that ACOE performed this on a frequent basis, but that information was still vulnerable until it entered the computer system. If the relief workers had a way to collect the information on the computer and then print a copy, I think that would be more safe and effective. Downloading the information to headquarters at the end of the day would produce another copy for safe keeping. The internet was not reliable at the time, but it was up periodically, so it still would have been better than just having a paper copy.

At the end of my stint, our driver had to pick up some more GISCorps people who were also ready to go home. I was able to get a quick look at some of the coastal damage on the drive through Gautier, Pascagoula, and then on to Stennis Air Field, which is near Waveland and Bay St. Louis. At Stennis I got a short tour of the GIS shop that was set up there. They were doing a lot of cool gee-whiz stuff with some of the information they had, unlike what we could do with the information we had to work with. Lucia and I were lucky to have the E-911 street centerline file. Here they had a satellite picture of the hurricane printed out and posted on the wall with a sharpie taped to the end of a string. People who came by there could sign their name on the hurricane as a kind of testimony. There were several maps they created hanging in the hallway. The shop they had set up there was mostly comprised of a GIS company that was displaced from Biloxi. They didn't have anything better to do without a regular office to go to or, in some cases, homes to stay in, so they decided that the only thing left to do was to help with the relief effort. The coastal EOCs in Gautier and at Stennis were gigantic and full of camper trailers, satellite communication equipment, tents, military vehicles, and semi-trailers full of supplies. On the way to Stennis, we stopped at probably three different gas stations along the coast to find them all closed and out of gas or power, or both. We finally filled up our van at the Stennis EOC straight from a tanker truck before we left for Jackson.

12. Filling up from the tanker truck at Stennis, MS (Carpenter).

We picked up an entomologist in Gautier, and in Stennis we picked up a fireman from Chicago and a GIS person from Arizona (I think). They were all part of GISCorps. Each had a different perspective on the time they spent there, and on the drive back to Jackson we had several hours to talk about what we did. It was amazing to hear the perspective of the GIS people who had worked on the coast. They were involved in rescue operations and had high-profile visits from federal officials. They had a huge EOC full of different resources to use, and those resources were also using GIS and knew what to ask for. In Wiggins, we were lucky if someone knew what GIS was. The fireman was really excited and amazed at the destruction and had heard many stories and experienced several recovery efforts using GIS while he was at the Stennis EOC. He was really pumped about using GPS to help in the relief effort and thought we could have done more with GPS in general. I had to argue that GPS was useless where we were since we did not have the infrastructure to support it in terms of data and people to run the systems in the field and in the office. The manpower was so scarce that if there was anyone in this town of 4000 people to help with GIS, they would have had their own problems to deal with getting help from FEMA, getting food and water, and patching up their roofs, etc.

The fireman also mentioned that an entity in Biloxi lost all of their GIS data because the main office was destroyed along with the off-site back up. There were gas lines that were broken and on fire and there was no information to tell which valve to shut off to cut the fuel to the fire. We all agreed that this was a lesson for all of us that it would be important to have a set of backups stored outside of the immediate city.

The entomologist had been working in Stennis since the very beginning of the disaster, probably more than 20 days. He was extremely tired and emotional about the whole experience, and had a difficult time even leaving the site. Someone he was working with there had noticed his distress and assured him that they would be alright, reiterating all the good things he had done and telling him that the people remaining there were going to keep going with what he had started. His shoulders slumped and he hung his head and wiped his brow under his straw hat. At that moment he had to accept that his job was over and that he had done everything he could.

I had a similar experience when I left Wiggins, but I was not quite as worn out. I did actually have a cold the entire time I was there, so I was definitely tired and needed to catch up on some sleep. Leaving the depot was a strange feeling, like I was quitting a job and walking out except I wasn’t disgruntled. I definitely didn’t want to leave with so much left to do.

In retrospect, there was an overriding theme that tied all of these events together. What I took away from this experience is that technology is a fantasy in a situation like this. As GIS professionals, we are so used to solving problems with a computer that I think we sometimes believe this is the reality for every situation. There are times when it can help, but finding the proper application at the right time is the key. Finding something effective we could accomplish with GIS quickly and without much processing was one of the goals here. There was a lot of good information gathered before we

arrived that we were able to leverage. What we had was basic, but we were able to produce a lot of quick and simple applications with it. We were able to provide information to get the relief workers where they needed to go, and get them there faster. In the end, we were able to say that we did something to help the relief effort.

11. Lucia and Katy with FEMA team at the Wiggins, MS Depot (Barbato).

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