A Look Back at Georgia's Response to the Great Flood of 1994

By

Tom Woosley
Principal Environmental Engineer
Georgia Department of Natural Resources
Safe Dams Program

One of the main objectives in dam safety is minimizing the effect of large storms on dams. While we talk about the design storm and its consequences, many will never actually be involved with or see the results of the design storm. The probability of the design storm ever occurring and the chance of a dam failing are minimal. However, their consequences are significant when one considers the potential loss of life. This low probability of occurrence makes it difficult to convince Mr. Dam Owner that a storm of this magnitude will happen. Tropical Storm Alberto changed a lot of attitudes in Georgia when it came ashore during the Independence Day weekend.

DESCRIPTION OF THE STORM

All indications were that this storm was headed for Georgia. The only questions were when, where, and how strong it would be once it came ashore. Some of the Safe Dams Program staff worked during the Fourth of July weekend in preparation for the storm. Given the nature of our job, we were expecting the worst, or at least what we envisioned to be the worst. There were several reasons why we were so pessimistic. There is a running joke within Georgia's Safe Dams Program. Our odds of an emergency response seem to go up anytime that Ed Fiegle, the Program Manager, travels out of state. Similarly, there are a few other indicators that we use in predicting emergency responses. Weekends, especially during a holiday, are prime candidates for emergency response calls. Since I was the acting Program Manager, I felt that all of these odds had increased significantly. News reports earlier in the year had also told us that Georgia was due for a hurricane.

Considering all of these factors, we were convinced that something would happen, but no one in the Safe Dams Program envisioned the severity of the storm and its destruction. Ironically, I was at a party on the Fourth of July and someone asked me about my job. After I explained, they asked what exactly we would do when Tropical Storm Alberto came ashore. I gave them a simple answer, never realizing what was in store for us.

On the Third of July, Brian Baker and I began contacting the emergency management personnel in the southwest corner of the state. At that time, this area appeared to be Alberto's destination and there are a couple of high hazard dams in this area. We received a very rude awakening as we began calling. No one seemed to believe that Alberto was going to do much. More interesting were the questions asking who

we were and what was a high hazard dam. There obviously had been a communication breakdown at some point since we notify the county emergency personnel once we classify a high hazard dam. We do not know if these people were new and had not seen the information, or if they were not interested since it was a holiday weekend, or they thought Alberto was not going to do much. Regardless, we were stunned by their comments.

In fact, it appeared that Alberto would not be a major problem since it was weakening as it came ashore. Many people were also mislead since Alberto was designated a tropical storm. It appears that most people think of hurricanes as being exponentially more severe than a tropical storm. One must realize that the only differences between the two is wind speed and barometric pressure. Alberto came ashore and moved very slowly. In fact, Alberto backtracked over some of its path. Many of us learned a new weather term thanks to Alberto's path. That term was training. Training occurs when one storm after another assaults the same area. Certain areas of southwest Georgia experienced this training effect.

Many areas of Georgia were hit with a tremendous amount of rain. The hardest hit area was Americus which received around twenty-six inches of rain in a twenty-four hour period. A narrow band of the state received significant amounts of rainfall. Rainfall amounts outside of this area were on the order of a two-year storm up to a 100 year storm. Portions of the state did not receive any rain at all. However, the rainfall in these less affected areas was enough to cause problems. Most of Georgia had already received above normal rainfall, saturating the ground. Flooding developed quickly since the ground was already saturated. Roads began to flood forcing the Department of Transportation to close them. By Tuesday afternoon, many roads were closed from just south of Atlanta all the way to Americus. Even portions of Interstate 75, as far north as Henry County, were closed due to flooding. Henry County is about twenty miles south of Atlanta. The interstate was closed just in time for the afternoon commute home, creating a traffic nightmare. In addition, there were a number of vacationers on the road. There also were more vehicles on the road due to the storm compounding the traffic congestion. Interstates 16, 75, and 475 in the city of Macon were also shut down due to flooding. The Ocmulgee river in Macon quickly rose to a flood stage due to the saturated ground conditions and all of the rain that had occurred north of Macon. While Macon/Bibb County did not receive an overwhelming amount of rain, the adjacent county, Crawford County did. Portions of Crawford County reported receiving over sixteen inches of rain during a twenty-four period. Unfortunately, most people did not realize how much rain was falling. One engineer I spoke to indicated that he had emptied his rain gauge twice within a few hours without realizing how much rain was falling. He realized too late that he should have been recording the amounts and time. Problems were quickly developing for many of the emergency personnel in various counties. In addition, the Department of Transportation was being swamped with traffic problems due to road closings. Our program was

only beginning to become involved.

EMERGENCY RESPONSE DURING THE STORM

Our program already had a staff meeting scheduled for Tuesday morning. We immediately realized that we needed to dispense with the normal business and develop a plan of attack for responding to the storm. It was decided that our first course of action would be to call each of the counties that were receiving excessive amounts of rain. We knew which counties to target since we were in frequent contact with the National Weather Service. One of the main objectives of our calls was to inform the counties not only which dams were Category I (high hazard) but more importantly to let them know which dams we had identified as potentially high hazard but had not completed the study. The plan was for each staff member to take a couple of counties and in an hour we would meet again to discuss the next plan of action. We were beginning to receive calls by the time we regrouped to lay out our next steps. Our calls to the counties were quite informative as well, with several counties informing us of dams that had already failed. From this point things got very busy.

Since the conference room we were meeting in was already reserved for us, and was conveniently located next to our offices, we took it over for our command center. This became our command center for the next week. This provided us space to lay out maps, files, etc.., while having access to a phone. It was also beneficial to have this room when the media was present and wanting to interview us and see the entire staff in action.

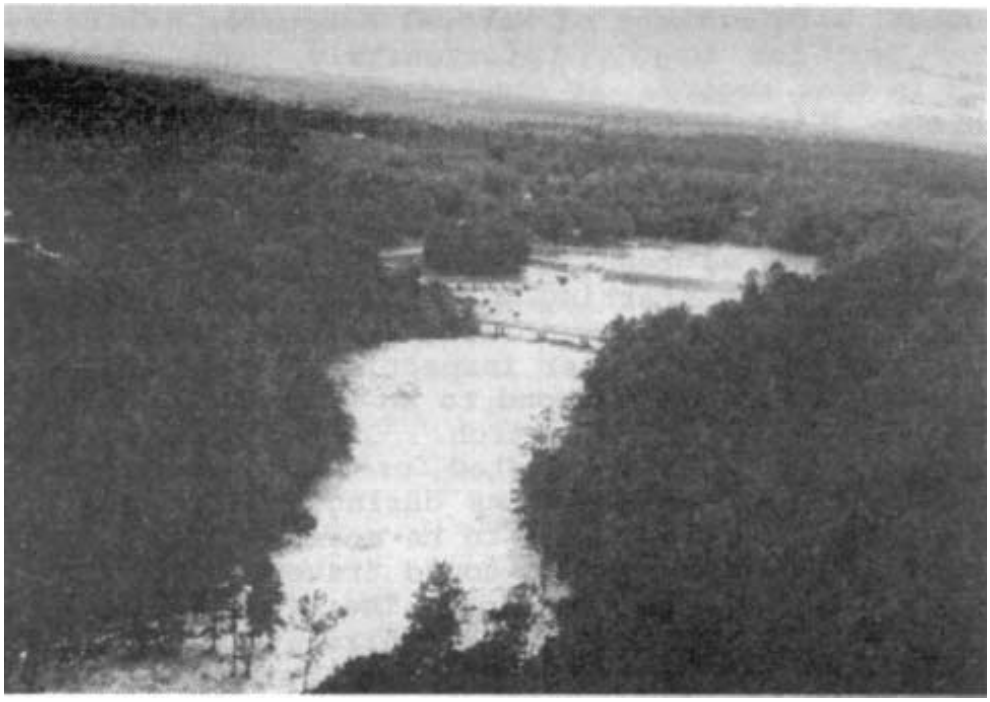
The combination of information on dams having already failed, the phone calls for assistance, and the forecast for additional rain dictated changes in our plan of attack. Brian Baker and Jerald Tittle, the two classifiers, responded to a call for assistance from a county just south of our office. Clayton County officials called requesting our assistance on a high hazard dam whose emergency spillway was flowing. Parts of this county received sixteen inches of rain overnight. On my way in to work that day, I was hearing reports of an entire mobile home park being evacuated as well as problems in other portions of the county. I figured then that we would be spending some time in Clayton County. When Brian and Jerald left the office to respond to Clayton County, it was for assistance on one dam. It was several hours later before we heard from them again. The message then, was they were headed to look at other dams.

While Brian and Jerald were in the field responding to various situations, Simmons Watts and I were handling phone calls. The frequency of the phone calls had picked up significantly by early afternoon. I quickly realized that our secretary was staying busy just keeping track of who called and which dams we had heard about failing. We quickly decided to make a table with this information so that we could keep a better track of this information. This table was

eventually used for the next several weeks and proved to be very useful. For example, when the media called wanting to know how many dams had failed, we were able to quickly reference this table and give them a count.

We spent a lot of time dealing with the media, especially that first week. At times, we were perhaps inconvenienced by some of their requests. However, we saw many positive things develop from our working with the media. Besides the fact that just about everyone in our program got at least one chance to be on television, there is the new awareness of our program. We continue to be contacted by the media regarding dams. Prior to this flood, our program was not very well known to the media. Some may say that is for the best and we use to think so as well. However, it has been beneficial on numerous occasions. Our exposure has ensured that we are allowed a chance to state our side while a news story is being developed. We have had the opportunity to have a TV news station report on our program and effectively show that our office is very busy and pointed out how we could use additional personnel. This is not to say that we did not have our differences with the media. Things would have gone a lot smoother on Tuesday if it was not for the false reports about dams failing. A dam failing is a unique event and every reporter wants to be the one to report it. Consequently, what some of them see or hear turns out to differ from what is actually happening. This was demonstrated very well with two of our high hazard dams that also happen to be in state parks.

High Falls State Park is located in Monroe County approximately thirty-five miles south of Atlanta. The dam is a run of the river structure designed for overtopping. Since most dams in Georgia are earthen, few reporters understand the concept of a dam designed to overtop. Consequently, there were reports on a regular basis about this dam failing. In fact, the television stations all showed footage of it overtopping and reported it as failing. The dam overtopped by approximately eight and a half feet. It is designed to handle nine feet of overtopping. While it never did fail, it did make for some impressive footage and as I saw later, it did some incredible damage. The downstream hazard for this dam is the park's campground located just off of the downstream channel. When the park superintendent went home Monday night everything seemed normal. The local sheriff called the superintendent about two in the morning. His statement was very simple, "If I was you, I would get those campers out now". They were able to get everyone out, albeit just barely. The last family did lose most of its belongings. Once the waters receded, we were able to see the devastation. From the toe of the dam down for at least a mile, the rocks were scoured and moved about. The force of the water washed out an old bridge. Its remnants wrapped around the piers of the new road forcing it to be closed for several days. Parts of the campground had water as deep as thirty feet.



High Falls State Park Dam
July 6, 1994

Indian Springs State Park is located very close to High Falls State Park. Everything seemed to be going well with this dam until about eight in the evening on Tuesday. While monitoring the radio, we heard that the dam had failed, roads were being closed and washed away, and the residents below the dam were being evacuated. This in turn prompted a new set of calls to our office. It took some doing, but we were able to talk with the park superintendent. Once again, it was an over reaction. The emergency spillway had started flowing. Since few had ever seen this they assumed the worst. Add to that, the fact that the park decided to close off the bridge just outside of the park entrance due to high waters. One can see how people jumped to their conclusions.

Tuesday was a long and eventful day. Some of us did not get home till Wednesday morning. Wednesday was just as busy as Tuesday. Heavy rains continued Tuesday night. According to many of the people we talked with, most of the dams that failed did so as a result of Tuesday night's rains.

The first part of Wednesday was spent assembling information,

obtaining additional support and supplies as well as plotting out the next course of action. There was not a big push to go out in the field since so many of the roads, including interstates, were closed. At our request, a Department of Natural Resources helicopter was put on standby for our use. Unfortunately, the weather was not cooperating in that regard. It cleared enough by early afternoon that we were able to start an aerial reconnaissance. The plan was to fly south of Atlanta and look at areas such as Macon that were inaccessible by roads. A couple of side trips were made while en route to the Macon area. Our flight path took us close to several dams, some of which we regulate. While we were in the air, four additional teams were starting a reconnaissance program from the ground. We were able to relay information to these teams on dams we saw and noted as needed further inspection. Additionally, when one of the teams was unable to respond to an urgent call about a dam, we responded and assessed the situation.

The aerial reconnaissance lasted for six hours on Wednesday. We were able to see twenty-three dams during this time. A couple of factors limited us in being able to be more productive. First, the weather limited how far south we could travel. Second, a number of airports were closed due to flooding. Therefore, finding an airport where we could refuel was difficult. Third, we were slowed by other stops. After circling around Indian Springs State Park, we ascertained that there was some damage, but we could not determine to what extent. Our pilot was able to find an open spot in the now dry emergency spillway and landed the helicopter for us to do a closer investigation. Needless to say, this excited a some of the park personnel and local residents. The park superintendent returned the favor by trying to charge us for parking! The dam appeared to be performing very well. The side channel spillway on the right end of the dam was the only area of the dam with damage. There were areas below the dam that were seriously scoured, but they did not impact the dam.

By the end of the day, we had observed several dams that had failed and many others with damage. The amount of flooding was overwhelming. Major rivers were well out of their banks with all sorts of debris in them. You could see furniture, toys, even entire decks floating along the river path. Even our pilot who grew up on the Mississippi river and flew missions in Vietnam said this was the worst thing he had ever seen.

We were able to confirm that two of our high hazard dams had failed. I contacted Crawford County on Tuesday to alert them to the situation and to advise them that they had a high hazard dam they should monitor, namely Kraftsman Lake Dam. They informed me it was too late. It had failed around 8:00 am on Tuesday. This was not unexpected since Kraftsman Lake Dam was only capable of passing the 100 year storm. This area of Crawford County received at least sixteen inches of rainfall on Monday/Tuesday.

The other high hazard dam we inspected from the air and found that it had failed was West Leisure Lake Dam in Houston County. This

dam is a very unique structure with a subdivision built on the crest of the dam. Our office was in the process of making the developer upgrade the dam. Therefore, the dam did not have an adequate spillway. Simmons Watts was sent to look at the dam on Tuesday evening. After wading in water that was sometimes two feet deep, they determined that the dam was still there but that everyone who was not already out should be evacuated off the dam and below. Sometime late Tuesday or early Wednesday the spillway finally blew out. The rest of the dam stayed intact.

Brian and I headed back to the office with the information we had obtained. After another late night at the office, plans were developed for the next day's activities. By this time, the weather was beginning to improve allowing us to make additional inspections.

ACTIVITIES FOLLOWING THE STORM

The weather was beautiful by Thursday. The ground inspection teams were able to complete a large number of inspections by Thursday. At this point, every high hazard dam that was impacted by the storm had been inspected at least once. Aerial damage assessments were being performed in conjunction with the inspections on the ground. We were unable to utilize the Department of Natural Resources helicopters beyond Wednesday. The entire fleet was put into service transporting everything from dignataries to baby formula to welfare checks. DNR's five aircraft flew a total of 728 hours during the flood recovery effort. They carried a total of 3600 passangers starting with our staff. The information we obtained from that flight was so valuable, we knew we needed to continue aerial reconnaisance. The only problem was everyone else saw this as the main means of transportation. Brian was able to carryout damage assessments from the air for over a month thanks to the Civil Air Patrol and the National Guard. Brian was assigned the task of flying each of the hardest hit counties to do assessments. He would fly over the entire county making notes on our USGS quad maps whether the dam failed, suffered damage, or survived. This information was then relayed back to those of us doing the ground assessments. Any dam noted as possibly having damage was then inspected. Reports were compiled on those dams that had damage and could possibly have an impact downstream if it failed. This information was then forwarded to the respective governing body for possible further action.

FINAL ANALYSIS

Over a thirteen hundred dams were looked at either by a team on the ground or in the air. Two-hundred and thirty dams were identified as having failed. Of those failing, only two were classified as high hazard dams. Their failures did not cause a loss of life. Thirty-one people did loose their life as a result of Tropical Storm Alberto. Fifteen of those deaths occured in the Americus area. It is the

contention of the sheriff and fire chief of Americus that some of those killed were the result of dams failing. There is some evidence to support part of their claims, but it is very difficult to know exactly because of the amount of rain. Regardless, most every Georgian was saddened to hear about each death.

It has been over a year now and our office is still working on projects related to the flooding. Cities are continuning to rebuild. Many of the people who lost their homes have a home again, but they have lost all of their personal possessions. Residents of South Georgia have a new appreciation for the damage that can be done by a tropical storm.

LESSONS LEARNED

Many people feel like Tropical Storm Alberto was a once in a lifetime event. While those of us in Georgia's Safe Dams Program hope that to be the case, we realize that similar storms/flooding could happen. Therefore, we need to learn from this experience not only to enhance our program, but to aid other states who might experience an event like this in the future. This is achieved by documenting various events, both good and bad. From that, one can make a list of lessons learned. The following, in no particular order, is some of the lessons I learned as a result of Tropical Storm Alberto.

- **Design Storm Event** - Contrary to what most citizens believe, the design storm can and does happen.

- **Emergency Action Plans** - Emergency Action Plans are a very valuable tool. Many of our dam owners either did not know they should call, who to call, or what to do regarding their dam. This created a difficult situation for the dam owner and put our office on the back side of the information curve.

- **Efficient Database** - It is extremely useful to have a useable database. Our staff was able to do data searches in a timely fashion for dams that would be impacted by Alberto. All sorts of media and management requests for information were provided as a result of our computer database. Our staff would have been hindered had we still been using the index card method of a database.

- **Aircraft Support Availability** - Access to sites can be difficult due to flooding. Aerial reconnaissance is a must. Make sure that you would have the resources to utilize aircraft during an emergency. This would include not only state agencies, but also the National Guard and organizations such as the Civil Air Patrol.

- **Positive Relationship with Emergency Personnel** - Have a good working relationship with your emergency management personnel.

Our staff experienced the benefits of a good relationship and the negatives of a bad working relationship during our emergency response efforts.

- **Verification of Information** - Any information regarding dams should be verified by someone with knowledge of dams and how they operate. It may not be practical to do this immediately, but it should be done as soon as possible.

- **Upgrade High Hazard Dams As Quickly As Possible** - The upgrade of a dam that is known to be a high hazard dam should be a top priority. Several dams that had been identified as potentially high hazard were damaged or destroyed during the storm. While none of the dams caused any fatalities, there were several that came close.

- **Documentation is Important** - Serving in a government agency, there is more than enough paperwork. However, documentation of everything is so crucial during this kind of an event. It has always been a policy of our program that a camera be taken whenever you go on-site. During the flooding, we spared no expense in photographing what we saw. We now have two large notebooks with over 1100 slides from the flood in them. These slides have paid for themselves time and time again when we needed to do a presentation or reference a dam that was damaged. In addition, our creating the table that showed which dams we knew had failed proved very helpful to everyone.

- **Work with the Media** - Every effort should be made to let the media know who you are and that you are accessible even during a crisis situation. They have a job to do and will do it whether we cooperate or not. You must work with the media if you expect positive results.

- **Educate Others** - Use training seminars, newsletters or whatever means works best for you to educate others about dams. Specifically, the media and local emergency management personnel should be versed on the basics of a dam and some of the terminology used.

- **Have a Command Center** - It may not practical to have a room dedicated solely for emergency situations. However, there should be an area that could be easily converted. In our case, the conference room was an ideal command center due to its location, size, and the furnishings. Most importantly, this room was converted to a command center without any money being spent.

- **Tropical Storms Are Devastating** - Tropical storms can be as bad if not worse than hurricanes.

- **Emergency Action Preparation** - There is no substitute for practice. Doing mock situations or having worked through an actual situation helps work out any difficulties in the system.

- **Good Samaritan Law** - Every state should have a Good Samaritan Law. Our office was overwhelmed with offers of assistance. Unfortunately, we had to decline these offers because of the potential liability since Georgia does not have a Good Samaritan Law. Our office is hoping to have a Good Samaritan Law introduced in this next legislative session.

- **Stay equipped** - Keep your office well equipped with supplies that might be useful during significant events. Case in point, was our office on Wednesday. We had to send someone out to get rainsuits for some of our staff and the additional help.