Alabama Geological Society 41st Annual Field Trip Report

By
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The 41st Annual Field Trip of the Alabama Geological Society was held jointly with the Southwest Alabama Geological Society from November 11 to 13, 2005, along the Alabama Gulf Coast. The dates of the annual field trip are somewhat variable however, from October to December, and dependent upon the availability of people and resources. Although the planning for housing, food, transportation, the guidebook, and other elements of an always successful outing is always extensive, one element is resistant to control – the weather.

Experienced field trippers are acutely aware that weather forecasts in Alabama, at almost any location, are not to be relied upon as predictable. This year's field trip fell during the latter part of the 2004 hurricane season, which NOAA named "one for the record books," as eight systems reached tropical storm status during August alone, eight hurricanes reached landfall on the U.S., and four storms hit Florida in the same season.

Less than 60 days before many of us were driving south to Mobile, Alabama to join our coastal compatriots, Hurricane Ivan had devastated a portion of the Gulf Shores with a landfall wind speed of 120 mph. The planners of the field trip could not have anticipated this past year that our Alabama coast would exhibit some of the most destructive evidence for nature's power that shapes our coastal environment.

Although the week's weather in Birmingham was rainy, the forecast for the weekend had been positive, with clearing skies predicted for Saturday. And so after a nearly five hour drive south from Birmingham, I was disheartened by the overcast skies above Mobile as they darkened considerably and the heavy rainfall began. Just a few miles from the Brookley Conference Center, the highway was awash with runoff and visibility had dropped to tens of yards. The traffic slowed, some drivers pulled to the side, but I decided to press on. It sure looked like it was going to be a wet weekend this year.

By the time I turned into the Brookley complex however, the rain had completely stopped, and although the road was clear, I wasn't quite sure where to turn for the Conference Center. So as I passed a building where, some people were standing, I asked for directions. The next stop was the local security office where after a brief phone call, the officer provided me the key to my room and directions to the center.

Arrivals at the pre-meeting mixers are always highly anticipated – and 2004 was no exception. Bright lights, good buddies, and better food and drink pick up even the darkest of nights (the moon was new Friday night). We all thank Thompson Engineering and PPM Consultants, sponsors of the icebreaker refreshments (beautiful food trays of meatballs, mixed fruit, grapes, crackers and cheese) and liberal libations (from Chardonnay to American beer and soda).

At the evening overview, Doug Haywick (USA) announced this first ever joint meeting with the Southwest Alabama Geological Society (SWAGS), and introduced Terry Osborne as SWAGS's president. We were cautioned that if the inclement weather continued Saturday, our boat transportation about Dauphin Island would be at risk of cancellation. But that wouldn't stop us, the participants, or the leaders from exploring the complex of geological environments of coastal Alabama.

Among the speakers who introduced field areas and problems included Doug Haywick (modern sedimentology of the Mobile Delta), Eugene Wilson (emeritus USA, recent history of Dauphin Island), Jeff Caldwell (Dauphin Island municipal water system), Tony Fisher (Mobile

municipal waste water treatment), Mimi Fearn (USA, paleoecology of Weeks Bay), and Keith Blackwell (USA, the 2004 hurricane season and background of Hurricane Ivan).

By the end of the evening, I was looking forward to a good night's sleep which would greatly improve one's outlook for an uncertain tomorrow. Upon my arrival at night, the ground floor of the conference center seemed rather plain, with painted cinder block construction. On the way to my room, I was expecting no more than something quite modest, perhaps a bit lower than Motel 6. On unlocking the door to my third floor room, I was pleasantly surprised at its size – in fact, as I looked across the room from the bed nearest the door, I saw a central sitting area, a mini-refrigerator, a central bathroom, and another bed at the far end. Very nice, I thought, but the room did seem a bit chilly. The wall held a thermostat, but upon fiddling with it, I couldn't discover how to turn on the heat. A hot shower was certainly in order, and I decided that a few extra minutes of steam might raise the room temperature by a couple of degrees. Unfortunately, this effect wasn't dramatic and didn't last long. Extra blankets soon provided the thermal comfort in bed that was lacking elsewhere.

Hot coffee and doughnuts at 7:30 the next morning partially replenished the ergs of energy expended throughout the night maintaining a viable state of life. By 8:00AM we were on the bus, heading for the west end of Dauphin Island under bright, clear skies. As far as we were concerned, the forecasters won the Las Vegas lottery.

Just east of the schoolhouse, we turned towards the dunes, parked, and walked to the south shore, facing the open Gulf of Mexico. By now the sun was warming the sand, and us. Off came the jackets and field boots – on went the short sleeve shirts and sandals (overheard on the beach "Shoot, I should have brought sandals!"). Shorts would have been more comfortable than Goretex rainproof leggings. As I said, on an Alabama Geological Society field trip, you must be prepared for the widest variation in field conditions.

Walks along the beaches emphasized our region's microtidal environment, with gentle, wind-generated waves lapping the shoreline, barely moving sand-sized grains to and fro. Birds skittered out of our way. A gentle breeze cooled the skin. From the beach we shuttled by group in small boats to Sand Island, just a few minutes away. Standing a few feet above sea level on such a clear, sunny day, it is difficult to imagine this overgrown bar in the midst of Hurricane Ivan, precisely because the storm's nighttime surge may have completely submerged it. Peritidal life is hardy indeed – the southern sides of the low grassy dunes were eroded but not destroyed, crabs must have hunkered in their burrows, as they now scuttled about, not unlike us geologists here examining a landscape that was battered but not broken.

A quick boat run towards the east end of Dauphin Island took us past new beachfront mansions that dwarf the older island housing. Apparently unaffected by Ivan's recent fury, these homes still face future prospects of continued beach erosion and possible hurricane landfall. Others elsewhere were not so lucky. Further out on the west end 44 houses were washed off their pilings, and 110 more were so badly damaged that they may face demolition, the Decatur Daily News reported recently. Near Fort Gaines, we saw a set of nine rock jetties that were built in the 1950s to protect the east end of the island from severe erosion. The jetties are now isolated islands of rock some 100 feet from shore.

South of Dauphin Island, numerous gas rigs dot the horizon like condos along Miami Beach. Nearly constant helicopter traffic softly droned in the background. Folks looking for a vacation or second home on Dauphin Island to "get away from civilization" will find ground-to-sky reminders even when facing the open Gulf.

After such an exhausting morning, we drove the short distance to the pavilions near the fishing pier for lunch. During the field trips of previous near the center part of the state, lunch was sometimes catered by The Speedy Pig (of Russellville). (Overhead while waiting for the arrival of the boxed lunches – "I guess they couldn't get the Speedy Pig to deliver down here". "So what are we having for lunch?" "Shrimp". "Where are my shoes?"). When on Dauphin Island, eat like

the natives – the lunch included shrimp, corn, baked potato, cole slaw, Fig Newtons, Oreos and soda.

The warmth of the December sun countered the coolness of the rooms the night before at the Brookley Conference Center. Apparently, the difficulties I had with the thermostat in my room were more widespread. Of course, field geologists must be, and are, by nature, resourceful under adverse conditions. And the prospects of a cold night with little sleep does nothing if not stir the active imagination for creative solutions to what should be a simple problem. "I had every blanket in the room on my bed." "I turned on the heating lamp in the bathroom and ran it for a while." "I kept the refrigerator closed to keep the cold air in".[Huh?] "I turned on the microwave." [Turned on the microwave? Unless it was raining in your bedroom, a microwave oven shouldn't have that much effect on dry air, right?]. Never let it be said that members of AGS and SWAGS are ever at a loss for inspired solutions!

Our second stop of the day came after lunch – we were headed to the Dauphin Island Water and Sewer Authority treatment plant for a tour of its facilities and operations. As we were cleaning up, and making a pit stop near the pavilion, I overheard Greg Karstens remark that the wastewater treatment plant was particularly appropriate right after lunch, and he wondered aloud whether or not we might arrive there for the tour before some of our own….

At the plant, we met Jeff Caldwell, its manager and Jeff Collier, mayor of Dauphin Island. (The name Collier seemed familiar to me – I recalled that when I taught marine geology at the Sea Lab, one of the boat captains who took us on local trips was Rodney Collier. Jeff confirmed that Rodney is a member of the family, a 3rd cousin to Jeff. Dauphin Island is indeed a small world.)

Dauphin Island is not without water, of course, as shallow wells tap the rainfall that recharges the freshwater lens in the surficial permeable sands. But being surrounded by the Gulf of Mexico and Mobile Bay/Mississippi Sound, the island's freshwater aquifer is bounded by saline water beside and below. Water is pumped from a 300-foot deep well and then pumped to the plant to be treated by reverse osmosis (RO).

The RO plant on Dauphin Island is the first of its type in Alabama to treat municipal wastewater. The RO process is so efficient that it could be used to treat Dauphin Island's wastewater for redistribution back into the drinking water system. But the public is not yet ready to accept such water for drinking, and so it is distributed during the summer to the golf course, and during the winter it is sent into Mobile Bay via a gravity-driven pipe. With present concerns about the "health" of Mobile Bay, under assault from surrounding industry and the great growth of local population, it is interesting to consider that treated Dauphin Island wastewater pumped into the bay is cleaner than the "natural" water.

From the water treatment plant we visited the east end of Dauphin Island, where some of the group toured the estuarium and others walked the road past Fort Gaines. Recent storms deposited several feet of sand on the asphalt, now bulldozed to the side. And sand from the recent dredging of Billy Goat Hole (near the estuarium) was simply piled at the end of the road facing the Gulf. The 10 to 15 foot high mound made an excellent observation post from which to observe the detached groin field to the south and the offshore gas rigs.

The last stop of the day was the Clifton C. Williams Waste Water Treatment Plant of the Mobile Area Water and Sewer System. Northbound on Dauphin Island Parkway, we saw on the bay's western shore numerous piers with storm damage, and roadside crews continuing to clear debris and repair various utilities. As we passed the Belle Fontaine Baptist Missionary Church, in the midst of debris, a sign seemed to answer the question of how to maintain faith under these difficult circumstances – "What is missing in CH _ _ CH?"

Arriving at the Mobile treatment plant about 4 PM, we met Paul McClellan and Tony Fisher, who guided us through the facility. If one had never been to such a treatment plant, one might suspect that the various odors about the plant would be suffocating and nauseating. Such

was not the case at this plant. Odors were mild at worst, and nearly non-existent at best (with the wind blowing in the right direction).

With the exception of some debris that is removed by screens in the head works, there is little evidence of the source of the wastewater treated at the plant. The debris-free water is then sent for primary treatment to rectangular clarifiers. Among the concrete tanks and steel walkways, we passed strings of fishing line strung across the clarifiers. An odd add-on I thought, that didn't quite fit the original equipment. Sure enough, Tony explained, the line was added to deter seagulls from landing in the clarifiers and fouling the water under treatment. I'll bet the public doesn't know that its drinking water is free of both human and seagull waste too.

Tony remarked that not many would choose to sort through debris that arrives daily with the 21 million gallons of influent, but the grit piles of sand and small items are legendary for what occasionally catches the eye of an employee (whole Advil pills, and a diamond ring that had been accidentally flushed down a toilet many miles away). The plant rule – if you find it, it's yours.

We followed the water, now relatively clean, to some bioreactors where bacteria are treated to a smorgasbord of dissolved substances. After the bacteria have had their fill in the brown liquor (don't even think kahlua!), the activated sludge mixture is sprayed with chlorine to disinfect the water of all pathogenic organisms. Biosolids are removed and eventually applied to 4,000 acres of Bermuda grass. Think of that the next time you cover that patch of soil in the front yard with sod.

After additional treatment, water from the plant outfalls into Mobile Bay, and like the effluent from the Dauphin Island plant, that from the C. C. Clifton plant dilutes dirtier bay water and makes it cleaner. Tony remarked that big mullet seem to favor the outfall location.

With mullet on the mind, and darkening skies after sunset, the thought of a cold beer and a dinner of hot, fresh fish beckoned as we bid Tony adieu. Back at Brookley the beer was indeed cold. The fresh fish dinner required a short hop to the Bluegill on Battleship Parkway. Although a Mobile fixture since the 50s, the original Bluegill was destroyed by Hurricane Frederic (1979). The restaurant is clean, but the roadside property seems to have fared not so well since then. The Beck's dark was cold, the grilled tuna was delicious, and the zucchini and corn hot. Highly recommended, for both the fish and an informal, family atmosphere.

The evening speakers after the first field trip day are always at a disadvantage due to an audience suffering from physical fatigue and too much beer. By 7:20PM, however, Mimi Fearn had half a chance to engage what few neurons were still firing with an overview of her studies on the effects of the 1920s Causeway construction on the upstream Chocalata Bay. Mimi succeeded admirably, at least with this geologist. The Causeway roadbed dams the tidal wetlands upstream by an 80% reduction of pre-construction cross-sectional area. It's interesting to consider environmental arguments for removing the existing structure and building an elevated roadway that permits a greater area for tidal exchange. Would Chocalata Bay adjust to a pre-construction equilibrium? Should pre-construction conditions be a goal? It's clear that this part of the delta is a complex sedimentary system incompletely understood at best.

From the water-centered communities of invertebrates, we were introduced to the groundwater-dependent community of Fairhope by Dan O'Donnell. Dan's technical studies of the groundwater aquifers by traditional geologic methods replaced a largely "hit or miss" former drilling program. We would see the next day results of some of Dan's studies.

Terry Osborne briefly introduced a problem site from which benzene and MTBE contaminated a public water well in Summerdale, Alabama. His extensive studies led to a remediation project that has removed over four tons of petroleum contaminated groundwater. Although Terry prepared his material for a stop late the next day, our schedule looked full, and with an early sunset, it was decided to devote the extra time to the Gulf Shores hurricane damage sites.

Never let it be said that AGS field trippers are unAmerican – not with a hearty breakfast of Coke and Krispy Kremes to provide the energy needed for a rough day ahead in the field.

Under overcast skies we headed for the Causeway, where Mimi Fearn continued her introduction to coring studies of the delta and hydrologic history of Chocalata Bay. While standing on the turnoff, just yards from Causeway traffic, we saw the numerous pilings of Interstate 10 barring the free flow of water. Constricted flows under overpasses accelerate local currents, which carry sediment further south. In response, grass beds have prograded south of the Causeway. Complex systems, indeed, adjusting on scales longer than a lifetime.

The breezes picked up, the temperature dropped, which marked the signal to head for the bus and the next several stops, Fairhope city wells #1 and #3, where Dan O'Donnell discussed aquifers, geologic prospecting, ADEM regulations, property owner's rights, and other issues related to groundwater development and use.

Although groundwater issues are exceedingly important and of great practical importance, the one-time geologic visitor, standing by a 2.5 million gallon tank with the sonorous hum of pumps in the background, finds it somewhat difficult to reach that fevered pitch of activity and excitement. Even Dan admitted that because of his highly successful application of traditional geologic methods to well field development by the city of Fairhope, water supplies now appeared more than adequate for the next year's needs – "Bummer for my business," Dan remarked.

Bummer indeed, as the last of the remaining doughnuts disappeared in the shadow of Fairhope well #3.

Doug Haywick announces that we're an hour ahead of schedule, and so on the way south we make an unplanned stop at the Fairhope pier, now closed unfortunately due to damage by Hurricane Ivan just six weeks before. Under overcast yet calm skies, it is difficult to imagine the forces that ripped away meter-long slabs of bricks from the sidewalk. A second stop at nearby Mullet Point Park took us to more extensive evidence of Ivan's forces. The pre-storm shoreline had been lined with private piers, but now only a few scattered remnants remain. Extending into the bay from the shore, neat columns of pilings that point to nowhere stick up out of the water like an army of toothpicks arranged by an 8-year old. Grassy slopes armored by interlocking concrete blocks fared somewhat better, except in the vicinity of walkways, pipes, and other interposed structures.

On exiting the park, the roadway turn was a bit tight for Stephanie, the bus driver. As the bumper scraped pavement with that awful grinding sound of metal on stone, an unidentified cry arose from the back of the bus – "I knew I shouldn't have eaten those extra doughnuts this morning!"

On the bayside roads to Pelican Point, we passed increasing signs of storm damage – downed tree limbs, piles of trash, and numerous appliances hauled to the roadside, crumpled and crushed beyond recognition. At Pelican Point, a sign on the Pink Pelican apologized to us "Sorry, we're closed".

In contrast to the increasing damage concentrated along the bay shore, areas further inland seem downright unaffected. We passed Fox Squirrel Farms, a development of horses, cattle, finely manicured lawns, and starter mansions – but not a single discarded appliance or curbside trash pile.

By noon we had arrived at the Weeks Bay National Estuarine Research Reserve, ready for lunch. The overcast skies had darkened a bit, the temperature was now significantly colder, and the concrete picnic benches even more so. But the traditional field lunch of hot BBQ, cole slaw, potato salad and soda helped to hold the chill at bay.

In the beautiful auditorium of the visitor's center, Jim Connors continued his introduction to the increasing chemical threats Weeks Bay faces due to runoff from surrounding agricultural development. In the midst of developed land, the Weeks Bay preserves includes rare acreage with pitcher pant bog and bottomland swamp. I particularly enjoyed the solitude of the quiet hardwood forest on the walkway to the shoreline salt marsh.

The solitude of the forest was reinforced during our pontoon ride in Weeks Bay, during which Doug Haywick reviewed the work of his research group on the sedimentologic history of the bay. But this was winter, and we saw no other boats in the bay. Come summer I'd bet the solitude is broken by noisy motors and numerous wakes. Interestingly, Weeks Bay preserves precious little evidence of hurricane storms – thin deposits are rapidly mixed with sediments below.

By 2:30PM we're back on the bus, heading for Gulf Shores, through civilization that stands in stark contrast to the isolation of the protected forests and the solitude of open water. Through Foley we see reminders of our more mundane existence – a Skate Zone, Pizza Hut, the American Legion Post 99, WalMart SuperCenter, and Lambert's Café ("the only home of throwed rolls" – see www.throwedrolls.com).

It's a chilly Saturday afternoon, the skies are gray, and as we pass the Chick-Fil-A, a guy in a cow suit is waving to passers by. In the midst of a few chuckles from the back of the bus comes a sobering response – "Be grateful for your job".

We had to stop briefly in the Tanger Outlet Center parking lot to exchange a few folks with those riding in other vehicles. To some bus riders, the convenience factor was not in their favor ("So we gotta stop here to let them off so they can get home early?" Also overhead in the bus – "What's this stop?" "Gotta be another sewage treatment plant – and by the way, I'm feeling the urge right now!" "No problem, there's one last seat in the back of the bus on the right – private room too.").

We're getting closer to ground zero, the bulls eye of Hurricane Ivan. Many of us had not yet seen much of the target zone except for a few photos in a newspaper or magazine. The bus crosses the Intracoastal waterway. Trash marks the high water line, some nine feet above the lagoon. Heading east along Highway 182, the damage increases exponentially. Debris lines the streets and remains scattered across lawns and parking lots. The Windemere was red-tagged – no entry permitted. Rectangular buildings slump in arch-like shapes from ground floor collapse.

We stop at Romar Beach for a walk along the shore. Pilings mark the former locations of some structures – destruction was total. For other buildings, some structure is left, but nothing can be repaired; remains will be demolished and removed. A number of buildings appeared opened up on the gulf side like a can of tomato soup ready for lunch. With outer walls removed, bedrooms, kitchens (some with appliances canted at odd angles), electrical cabinets, all are completely exposed. At road level above the beach, empty and broken PVC pipes emerge from within scarps of red-brown sandy soil like tentacles of a cockroach waving in the wind.

Most structures were anchored on pilings placed deep beneath the beach. Now the bottom floor (or the paint line on the piling if the bottom floor is missing) is about nine feet above the sand. It is striking that the beach is now clean and free of debris, while the buildings above the beach look like a lump of shredded wheat.

Yesterday we walked the idyllic intertidal of the west end of Dauphin Island – today the war zone of Romar Beach. Not even the roadside trash near Belle Fontaine or Foley could have prepared us for the devastation Ivan caused to the manmade structures of Gulf Shores. During a few hours on September 16, the value of hundreds of millions of dollars in property was blown away, tens of thousands of lives disrupted, and primary dunes of Gulf Shores simply disappeared. All of this from "only" a category 3 hurricane.

And what of Ivan's damage from the perspective of the geological record? A few washover lobes of sand that will be bulldozed back to the beach before the beginning of the tourist season next summer, a minor unconformity here, a couple of inches of new sand there. In a thousand years, Ivan may be unrecognizable in the bioturbation of the present.

Is there no more fitting end to the 41st annual field trip of the Alabama Geological Society and the Southwest Alabama Geological Society, to come to a close on Ivan's unconformity at Gulf Shores?

May we meet under more pleasant conditions in 2005.