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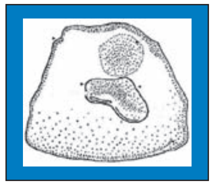

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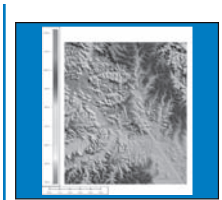

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Louisiana Geological Survey

NewsInsights

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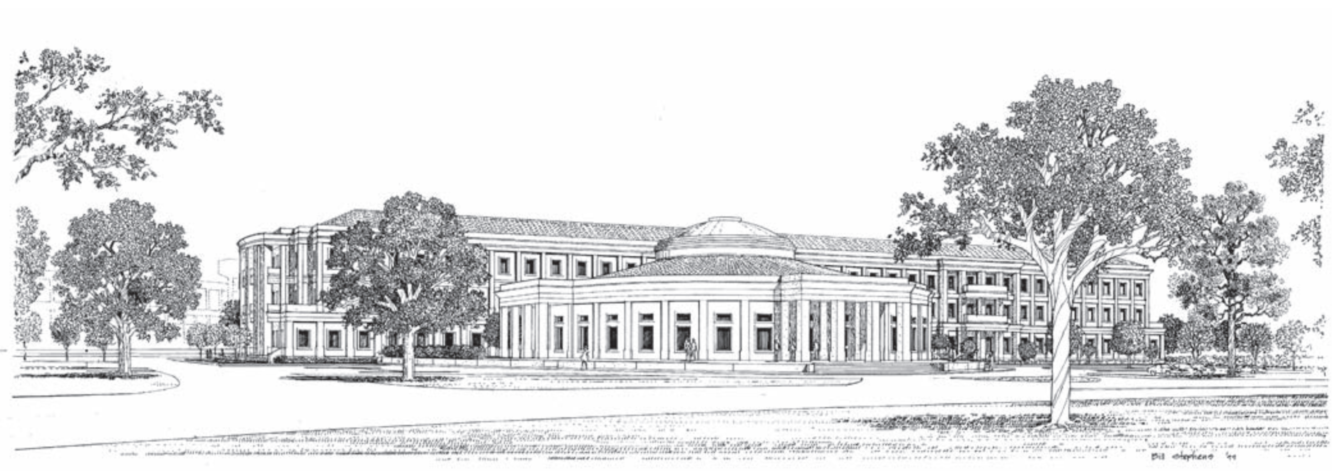

Ceremony Marks Building Opening

The Energy, Coast & Environment Building officially opened on October 20, 2003. Dignitaries attended a ribbon cutting ceremony and made brief remarks including LSU Chancellor Mark Emmert, LSU System President Bill Jenkins, Senators Mary Landrieu and J. Bennett Johnston, and Secretary of the Louisiana Department of Natural Resources Jack Caldwell. Other distinguished visitors included Provost and Executive Vice Chancellor Risa Palm, Vice Chancellor of Research Kevin Smith, Vice Chancellor Neil Mathews, LSU System Board of Supervisors member Charles Cusimano, Louisiana Independent Oil and Gas Association (LIOGA) President Don Briggs, State Fire Marshall V. J. Bella, and Louisiana Mid-Continent Oil and Gas Association (LMOGA) President Jim Porter. A reception was held in the Rotunda of the building following the talks for the visitors and building occupants.

The Louisiana Geological Survey is located on the second and third floors of the west or "Energy" wing of this building. The Center for Energy Studies is located on the first floor of the west wing.

The Louisiana Geological Survey

NewsInsights

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LGS Mission Statement

The goals of the Geological Survey are to perform geological investigations that benefit the state of Louisiana by:

(1) encouraging the economic development of the natural resources of the state (energy, mineral, water, and environmental);

(2) providing unbiased geologic information on natural and environmental hazards; and

(3) ensuring the effective transfer of geological information.

The Louisiana Geological Survey was created by Act 131 of the Louisiana Legislature in 1934 to investigate the geology and resources of the State. LGS is presently a research unit affiliated with the Louisiana State University and reports through the Executive Director of the Center for Energy Studies to the Vice Chancellor for Research and Graduate Studies.

Progress Report on the Chicot Aquifer Study

Douglas Carlson and Riley Milner

The study of the Chicot Aquifer of southwest Louisiana (Figure 1) is in response to a drought in the late 1990s that caused a major stress on this aquifer. The Louisiana Legislature encouraged the study of the state's aquifers to allow for ultimately more sensible management. In particular, there is a need to develop a groundwater model that can be used as a management tool of the Chicot Aquifer.

The most recent groundwater model of the Chicot Aquifer was completed in the late 1980s by the U.S. Geological Survey (Nyman et al., 1990). This study's groundwater model provides several enhancements on the previous model including incorporation of the water wells that produce a majority of the water withdrawn from the aquifer; an updating of groundwater demand to the year 2000; finer grid resolution; and more detailed hydrogeological characterization. In particular, this study in just the first six parishes (Acadia, Allen, Beauregard, Calcasieu, Evangeline and Jefferson Davis) includes examination of 502 geophysical or driller's logs as points of observation (Figure 2) used to determine various significant stratigraphic contacts, top and base of Chicot sand, and the base of freshwater throughout the Chicot Aquifer. No previous study has utilized as large a number of observation points to delineate the Chicot Aquifer. This study for the groundwater models divided the lithology of the Chicot into five significant lithologies: top confining clay, interbedded freshwater clays, interbedded salt water clays,

Figure 1. The Chicot Aquifer lies in the southwestern portion of Louisiana (the area within the bold black line). Currently initial hydraulic characterization has been completed for the full Chicot Aquifer. Hydrogeologic characterization has been completed for six parishes: Acadia, Allen, Beauregard, Calcasieu, Evangeline, and Jefferson Davis (shaded area). Two parish-size models have been constructed for Acadia and Jefferson Davis parishes (the part of the shaded area that is cross-hatched).

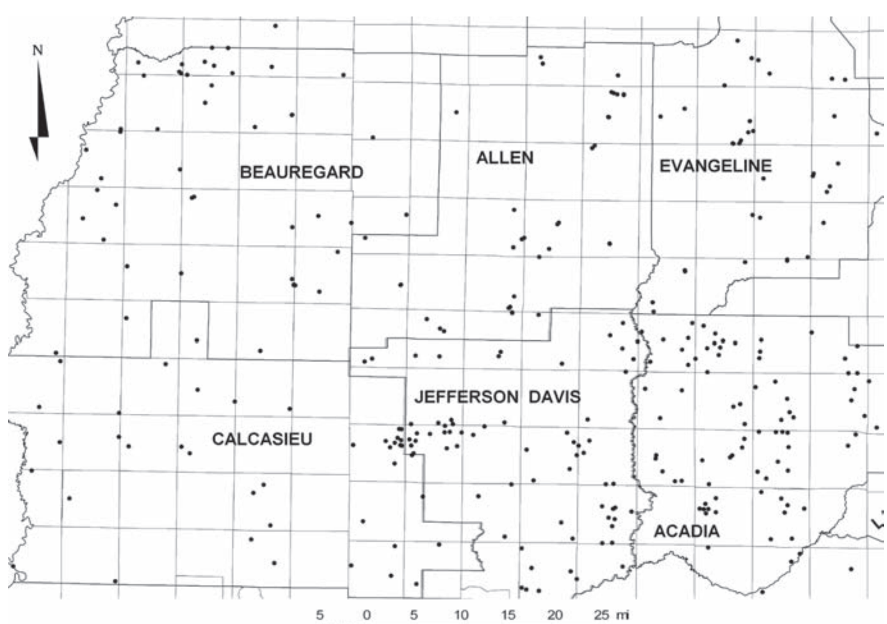

Figure 2. Location of oil, gas, and water wells used for development of Chicot Aquifer hydrogeology.

freshwater sands and salt water sands. The current groundwater model includes only the freshwater portion of the Chicot. This is because MODFLOW is not designed to model water that varies significantly in density (McDonald and Harbough, 1988) as a result of variable salinity. The geologic model being developed includes all of the Chicot given that groundwater models will probably be able to handle water with variable density sometime in the future.

This study's groundwater model is being constructed in a manner that takes into account a large increase in input data.This model incorporates hydraulic conductivity results from about 600 specific capacity tests, almost twice as many as any previous study (Figures 3a & b). The largest previous study, Rao et al. (1991), includes results from 325 specific capacity tests. The hydraulic conductivity values determined for this study of the Chicot Aquifer were derived by using the Bradbury and Rothschild (1985) technique for analyzing specific capacity tests.This study's source of specific capacity test data is the U.S. Geological Survey (2003). This study is also probably the first to include analysis of the recharge rate over a large portion of the Chicot Aquifer throughout the last 36 years. U.S. Geological Survey (USGS) discharge records from 36 yearly reports has been examined for 18 different USGS gaging stations located throughout southwestern Louisiana. The streams and their associated watersheds lie over almost the entire recharge subcrop region (Figure 4) as defined by Tomaszewski et al. (2002). These watersheds vary in size from 13.1 square miles to 1700 square miles. Nine of the eighteen stations have a complete 36 years of records to analyze. The other stations often have 10 to 20 years of record. Lastly demand for groundwater is considered for about 4,322 individual wells throughout the Chicot Aquifer. The 4,322 water wells in the model are from the 2491 irrigation, 1306 public supply, and 525 industrial water-wells. Because of their relatively low pumping rates, domestic wells have been neglected in the simulations.

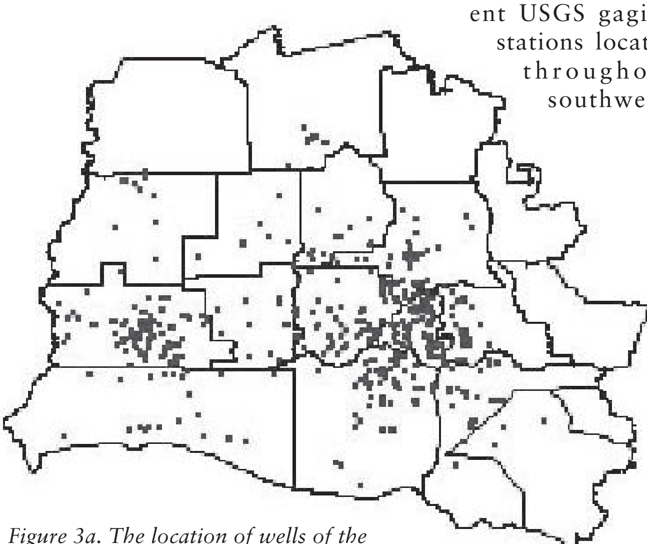

Figure 3a. The location of wells of the 605 specific-capacity tests that were analyzed for hydraulic conductivity within the Chicot Aquifer.

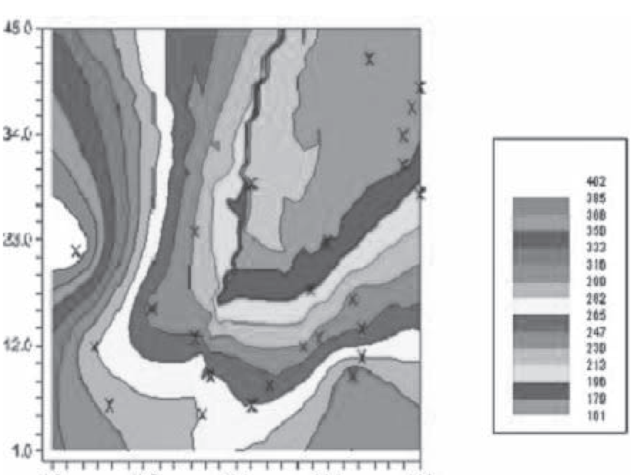

Figure 3b. The spatial distribution of hydraulic conductivity throughout the Acadia Parish model.

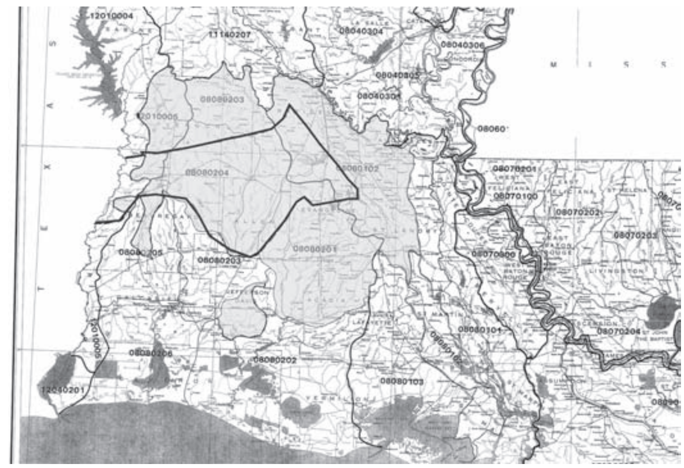

Figure 4. The extent of the 18 watersheds analyzed for recharge rate, (region highlighted in gray). The outlined region is the subcrop of the Chicot Aquifer as defined by Tomaszewski et al. (2002), within the black line.

Beyond the increased quantity of input data for groundwater model development, this model is based upon a framework that is a vast refinement over previous models. This study will use the idea of telescopic mesh refinement where a regional model is developed to gain an understanding of regional flow throughout the aquifer, and a series of smaller area groundwater models with greater refinement will use the information gained from the large model as a general environment to develop the boundary conditions for the smaller models. However, even the more general regional groundwater model used in this study has four times as many grid blocks as previous groundwater models, and a greater refinement of the spatial distribution of pumpage than previous groundwater models. Both this study and the Nyman et al. (1990) Chicot Aquifer model use the finite-difference modeling program developed by the USGS, MODFLOW. However, this study used a more current version MODFLOW 96 (Harbaugh and McDonald, 1996), while Nyman et al. (1990) used an older version MODFLOW (McDonald and Harbaugh, 1988). Calibration of the Chicot Aquifer involved testing a series of parameter values to minimize the difference between modeled and observed water-level values at well observation points. This study's set of 69 well observations is available from the USGS via the internet at http://waterdata.usgs.gov/la/nwis/gwlands. The duration and frequency of the data values vary among the wells within the aquifer, so the subset of all USGS observation wells used were those that had greater than 50 observations between 1960 and 2000.

Currently, Acadia Parish model has been calibrated and a Jefferson Davis Parish model is being developed. The MODTMR version 1.1 program (Leake and Claar, 1999) is used to construct the data sets for local models within the regional model. MODTMR specifies perimeter boundary conditions to the local models from the regional model. In addition, a total of 713 water wells (i.e., 41 industrial, 114 public supply, and 558 irrigation) are imported into the Acadia Parish model. For the Jefferson Davis Parish model, a smaller set of water wells are imported (32 industrial, 60 public supply, and 476 irrigation for a total of 568 water wells).These parish-scale models are discretized on far smaller grids than previous regional models. For example, the Acadia Parish model grid has 40 rows, 45 columns, and 16 layers, resulting in a grid size of approximately 0.32 square miles, while the Jefferson Davis Parish model grid has 50 rows, 50 columns, and 12 layers, resulting in a grid size of 0.26 square miles. Individual cells in the two parish-size models are about 1/4 to 1/3 square miles in area and are 50-100 feet thick whereas previous models had cells that are 4 to 42 square miles in area and hundreds of feet thick. As a result, the volumetric grid of the parish-scale model is a refinement such that these models will have hundreds of cells in the same volume of the aquifer that was a single cell in the previous regional groundwater models.The advent of the high-resolution model for these parishes allows for a much more detailed analysis of the aquifer because it allows for a greater understanding of the processes and dynamics of the groundwater system at various spatial and temporal scales. This model is the first of its kind for Louisiana.

With its significantly finer model grid, it is possible to analyze the response of the Chicot Aquifer at the sub-parish scale to a single major pumping well producing five million gallons per day (mgd). The Acadia Parish model was tested with a simulation of a well that is pumped at 5 mgd (Figures 5a & b). This simulated well has an impact of about 7 feet of drawdown in the first 10 years within the cell that includes the well. With the finer grid one can observe the cone of depression that is about 24,000 feet in diameter. However, the impact of this well is less than a foot at a distance greater than a mile. For previous models as well as this study's regional model, this impact would not be observed. This demonstrates the power of the telescopic mesh refinement system of modeling used in this project.

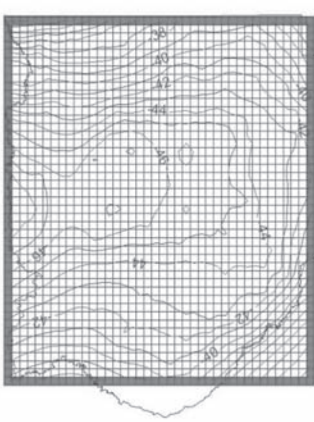

Figure 5a. The figure on the left is the modeled values of water-level in Acadia Parish before pumping begins.

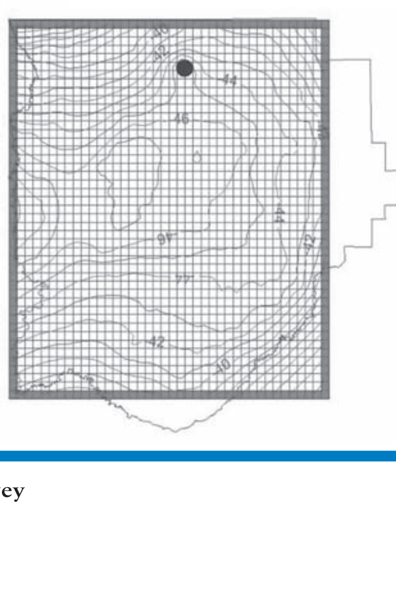

Figure 5b. The figure on the right is the modeled values of water-level in Acadia Parish after 10 years of pumping a well at a rate of five million gallons per day. The location of this well is where the dot is on the right-hand figure.

This model's results are successful given that they are reasonable in light of other observations. The model is fine enough to reveal the aquifer's response on distances of only a half-mile to a few miles. This will allow the model to be a convenient and accurate tool to test anticipated impact from future possible demands on the aquifer before any drilling/permitting/testing is ever completed. With this refined, high-quality predictive tool, it will be possible to avoid possible inappropriate choices of well placement by either adjusting well location or developing a well field instead of a single well. It will allow for remediation of impacts to be considered before they happen. This improved knowledge will lower costs of water use by avoiding possible lawsuits or reducing litigation times over unwanted impacts by taking care of these impacts before, rather than after, their occurrence. With this powerful tool it will be possible to manage this valuable resource of water in a more efficient and harmonious manner.

The fast-growing demand for clean, fresh water, coupled with the need to protect and enhance the environment has made many areas of the United States and the rest of the world vulnerable to water shortages. Competing users include industry, agricultural irrigation, and municipal water supplies for both human consumption and industrial processes. Recent studies have confirmed that water is a critical limiting factor in human economic development (Murck et al., 1996). In many areas groundwater is being mined. As a result there is a likelihood of water shortages in local and regional areas in parts of the U.S. in the near future (Barlow and Clarke, 2002). Thus, it becomes imperative that all groundwater resources be evaluated, and management schemes be implemented where needed.

Acknowledgements

Funding was provided through the Louisiana Department of Transportation and Development, Public Works and Intermodal Transportation Division. We would also like to thank the Department of Transportation and Development, Water Resources Section; the Department of Natural Resources, Office of Conservation; and the U.S. Geological Survey, Water Resources Division in Baton Rouge, for assistance in data collection and analysis. We would also thank Clint Willson and his students Asheka Rahman and Sherly Hartano of the Louisiana State University Department of Civil and Environmental Engineering for the contribution of their modeling results.

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Interest in Coal Seam Natural Gas (CSNG) in Louisiana on the Rise

F. Clayton Breland, Jr.

The Basin Research Energy Section of the Louisiana Geological Survey is continuing its efforts to work with state, federal, and private agencies to assess Coal Seam Natural Gas (CSNG) potential in Louisiana and the Gulf States. In an effort to coordinate the process of better understanding the CSNG resource in the Gulf Coast and perhaps help in obtaining funding to further research in CSNG, LGS, along with Peter Warwick of the USGS, has contacted members of geological surveys in the Gulf Coast region to establish a consortium of members who have an interest CSNG. The group that was assembled is called the Gulf States Coal Seam Natural Gas Consortium (GSCSNGC) and the first group meeting was conducted by conference call on August 20, 2003. The first meeting was called to get to know one another a bit and to discuss some CSNG issues in the member states and how we might go about getting funding to research CSNG. Member institutions and contacts of the GSCSNGC are: Jack Pashin, Geological Survey of Alabama, University of Alabama; Bekki White and Bill Prior, Arkansas Geological Commission, Little Rock; Steve Ingram, Mississippi Minerals Resource Institute, University of Mississippi (joined GSCSNGC November, 2003); Eugene Kim, Bureau of Economic Geology at the University of Texas; Peter Warwick with USGS, Ruston, VA; and F. Clayton Breland, Jr., Basin Research Energy Section of the Louisiana Geological Survey, LSU. Also in attendance were Mark Carl and Keith Thomas with the Interstate Oil and Gas Compact Commission (IOGCC), Oklahoma City. IOGCC represents the governors of oil and gas producing states and facilitates the gathering and sharing of oil and natural gas information, technologies, and regulatory methods. GSCSNGC believes it will benefit from establishing a cooperative relationship with IOGCC.

On another front, in October 2003, LGS participated in an industry-coordinated meeting to discuss issues associated with the exploration and production of CSNG here in Louisiana. The meeting was the brainchild of Diana Chance with Donner Properties in Shreveport. Chance has worked tirelessly the last few years to spread the word about CSNG and was involved in drilling some of the first wells in the state to specifically test CSNG. The idea of the meeting was to provide industry, state, and academic representatives a forum to discuss their ideas, interests and concerns, sooner rather than later, about CSNG in Louisiana from their perspective. Don Briggs with Louisiana Independent Oil and Gas Association (LIOGA) attended the meeting and was kind enough to provide the Jimmy Davis House as the setting for the meeting, which turned out to be a working luncheon. Industry leaders at the meeting included Devon Energy, Geomet, and Petro-Hunt, among others. Independents at the meeting included King Drilling and Mark V Petroleum. The state was represented by members from DNR's Office of Mineral Resources and Commissioner Jim Welsh, of the Office of Conservation. Gary Kinsland of ULL's Energy Institute and F. Clayton Breland, Jr. of the LGS were academic representatives. The meeting was pronounced a success and resulted in a request to form a committee to outline specific issues that might be addressed by the Office of Conservation to better facilitate the development of the CSNG resources.

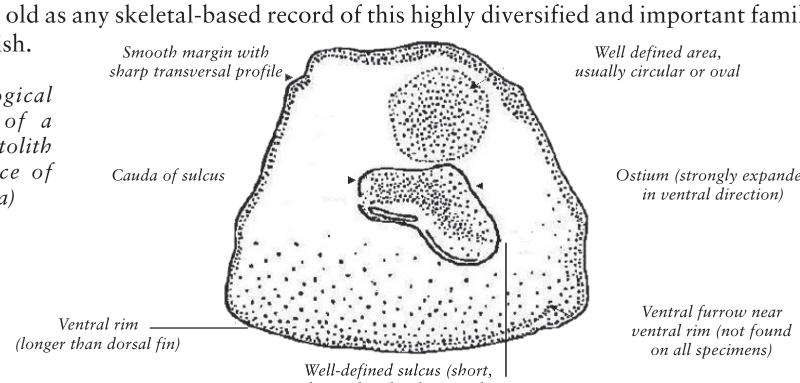
At present only about a dozen CSNG wells have been drilled in the state. Good information about CSNG exploration and development is hard to come by and rumors abound. There still remains a lot of interest in CSNG in the state and the Gulf Coast with a number of wells scheduled to be drilled near the end of 2003. LGS is pursuing funding and industry partners to further assess CSNG in Louisiana. Any questions concerning CSNG in Louisiana can be directed to F. Clayton Breland, Jr. at 225/578-8300.

Important Fossil Fish Remains Reported from the Cane River Formation near Natchitoches, Louisiana

Gary L. Stringer

Dr. Gary L. Stringer, a vertebrate paleontologist at The University of Louisiana at Monroe, recently presented findings at the Annual Meeting of the Socitety of Vertebrate Paleontology on significant fossil fish remains collected from the Cane River Site (middle Eocene, early Lutetian) along I-49 near Natchitoches. The remains consisted of otoliths or earstones from an important family of fishes known as gobies of gobiids. The family Gobiidae contains the largest number of species (approximately 1,875) of any modern family of marine bony fish. The family is also one of the most highly diversified groups of all modern vertebrates, yet its early evolutionary history is poorly known. Otoliths from gobiids were tentatively identified in a previous study of the Cane River Formation. Additional sampling of the site and subsequent analysis has verified the presence of species of this family of bony fishes.

The appearance of gobies in the middle Eocene is highly significant. First, it extends the range of gobiids in North America by at least 7 million years, from the Bartonian (approximately 39 million years old) to the earliest Lutetian (approximately 46.5 to 48 million years old). Secondly, the otoliths from the Cane River Formation represented over 10% of the total otolith-based fish assemblage. This indicated that the gobiids were not only present, but also fairly abundant and well established by the early Lutetian. The abundance of the gobiids may attest to an even earlier origin of the family and suggests the potential for older occurrences in the Gulf Coast Tertiary. Finally, the Cane River Formation gobiids appear to be older than the single gobiid otolith reported from the Harudi Formation (Lutetain) in western India. Thus, the Cane River Formation gobiids from Louisiana would represent the earliest well-documented occurrence of otolith-based gobiids in the world. Furthermore, the gobiid otoliths from the Cane River Formation may be as old as any skeletal-based record of this highly diversified and important family of bony fish.



Morphological Features of a Gobiid Otolith (inner Face of Left Sagitta)

Bayou L'Ivrogne and Steep Hill Creek Alluvial Valleys, Southern Natchitoches Parish: Example of Stream Piracy?

Richard P. McCulloh

In the Physiography chapter of his monograph on the geology of Natchitoches Parish, H. V. Andersen (1993) hypothesized that certain of the peculiar drainage patterns in the southern part of the parish are best explained as having resulted from the capture of the Bayou L'Ivrogne and "Steep Creek" (Steep Hill Creek) drainages by that of Kisatchie Bayou (Figure 1).

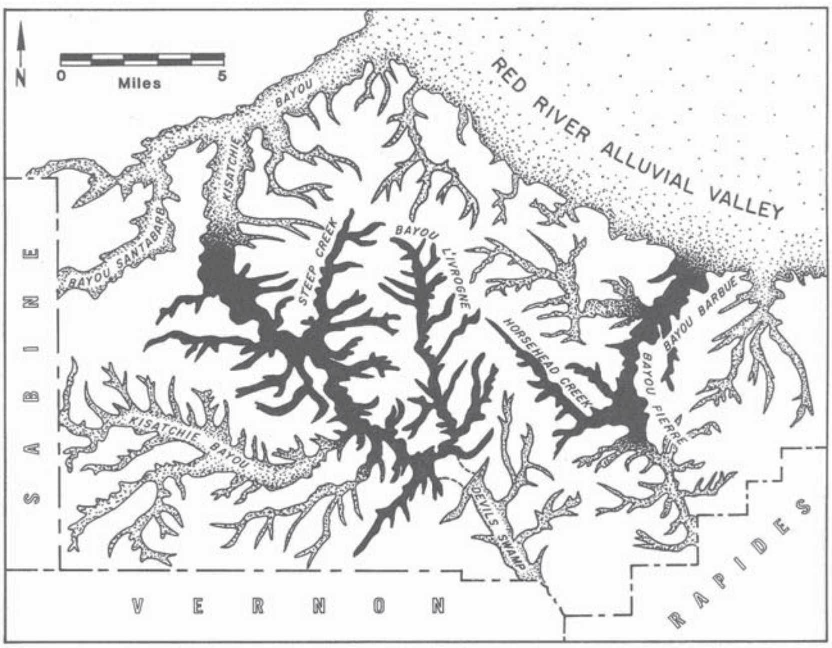


Figure 1. Index map of alluvial bottoms in southern Natchitoches Parish, with the area of hypothesized stream capture enclosed by the curving dashed lines (Andersen 1993, his figure 4).

According to this scenario, both Bayou L'Ivrogne and Steep Hill Creek originally flowed southward into the trunk stream of Devils Creek, a headward tributary of the Calcasieu River system that is now occupied in its own headward region by Devil Swamp; whereas today, Bayou L'Ivrogne and Steep Hill Creek ultimately drain northward via Kisatchie Bayou into the Red River.

One obvious characteristic of the alluvial valleys as mapped by Andersen (1992) in this portion of the parish is rectilinearity, with a substantial proportion of them comprising relatively straight segments trending N-S, E-W, NW-SE, and NE-SW (Figure 2). This suggests another possibility: that Devils Creek was never confluent with any of the drainages to the north, and that all these drainages have been configured primarily by their exploitation of zones of weakness corresponding to sets of systematic fractures (probably joints rather than faults) having strike directions identical to the above trends. (Joints are fractures with negligible displacement, and systematic joints are those that are throughgoing and occur in sets having characteristic orientations.)

A NW-SE topographic profile traversing the distal portion of the Bayou L'Ivrogne drainage near its confluence with Kisatchie Bayou, and continuing southeastward lengthwise through the headward portion of Devil Swamp, shows not only that a bermlike feature occupies the narrow gap between the aligned portions of the two drainages, but that Devil Swamp lies at an elevation nearly 15 meters *higher* than the adjacent, aligned reach of Bayou L'Ivrogne immediately to the northwest (Figures 3, 4). The topography of the area, including the relative elevations of the above drainages, therefore, suggests if in fact there was an episode of stream piracy, that following or coincident with it Bayou L'Ivrogne incised itself (cut down) dramatically to adjust to its new, substantially lower local base level; that some previously unidentified tectonic activity resulted in uplift of the area drained by Devils Creek to the south of the Steep Hill Creek, Kisatchie Bayou, and Bayou L'Ivrogne drainages; or both.

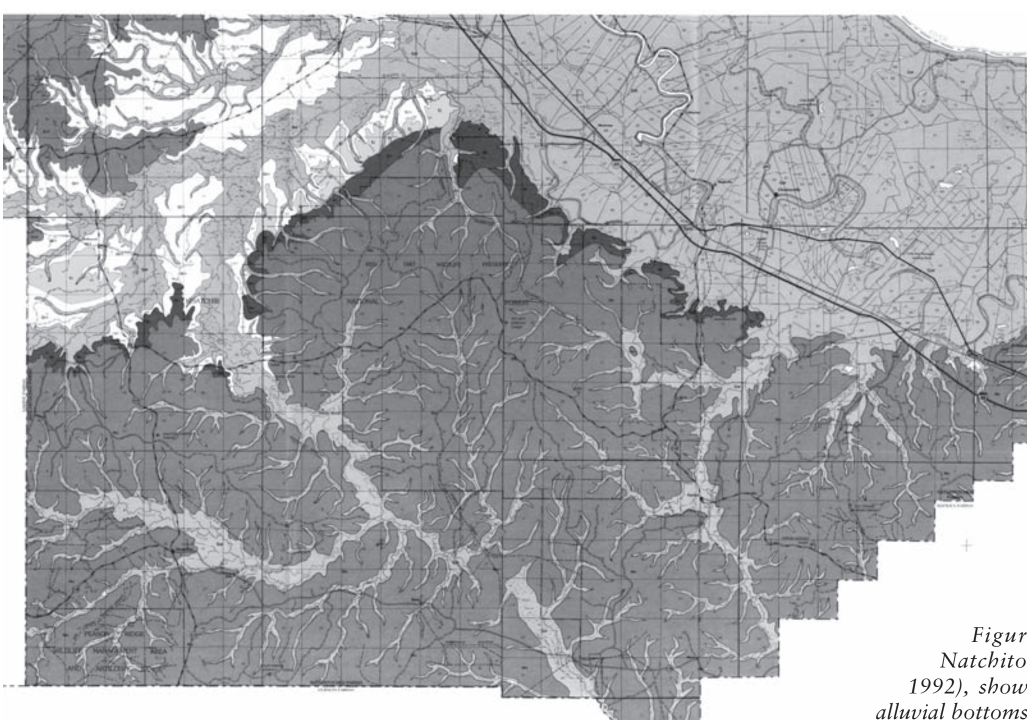


Figure 2. Surface geology of southern Natchitoches Parish (excerpted from Andersen 1992), showing rectilinear character of many of the alluvial bottoms and geologic-unit contacts.

The following detailed alternative hypotheses may thus be considered:

- The episode of stream piracy happened essentially as outlined by Andersen (1993); the lowered elevation of the course of Bayou L'Ivrogne relative to that of Devil Swamp reflects the subsequent grading of Bayou L'Ivrogne via Kisatchie Bayou to the local base level of the Red River.
- The episode of piracy was prompted and/or accompanied by uplift, with the relative elevations of Bayou L'Ivrogne and Devil Swamp determined in part by the uplift and by the incision of Bayou L'Ivrogne in response to that uplift.
- The episode of piracy happened essentially as outlined by Andersen (1993), with some detailed complications deriving from control of numerous reaches by zones of systematic fractures (joints).
- The episode of piracy was prompted and/or accompanied by uplift, with some detailed complications deriving from control of numerous reaches by zones of systematic fractures (joints).
- The apparent episode of stream piracy in fact never happened; the Devils Creek drainage was never confluent with the drainages to the north, and the observed drainage patterns reflect control by systematic fractures only. The Bayou L'Ivrogne course has always been lower than Devil Swamp, because Bayou L'Ivrogne has always been graded to the Red River, and Devil Swamp has always been part of the headward region of the Calcasieu River drainage basin.

Andersen (1993) did not discuss the topography in the area of the anomalous drainage patterns, especially the relative elevations of Bayou L'Ivrogne and Devil Swamp; nor did he discuss the possible configuration of some of the drainages by zones of systematic fracture sets. Although he also did not explicitly make reference to potential uplift in this area, his figure 56 depicts the post-Comanchean edge of the Winnfield salt basin as lying approximately 8 to 10 km (approximately 5 to 6 mi) to the northeast of the gap between Bayou L'Ivrogne and Devil Swamp, suggesting the possibility that relative uplift at least could have played some role in the development of the anomalous drainage patterns.

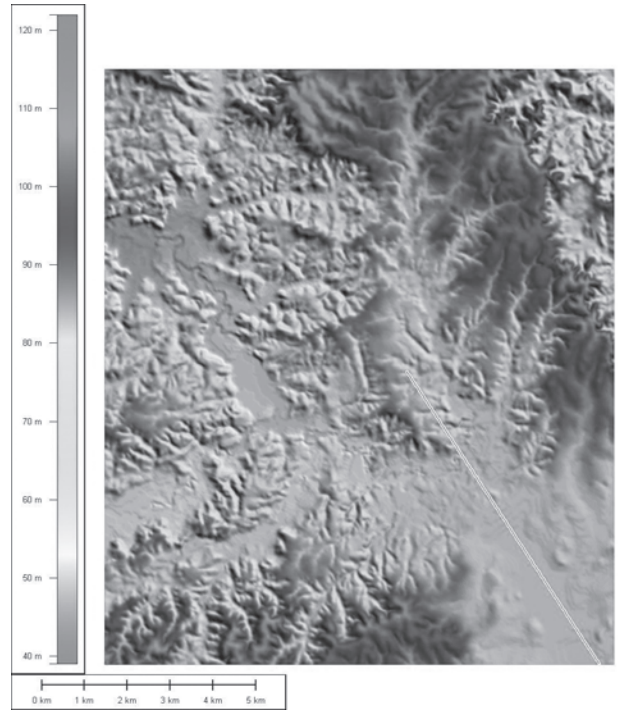


Figure 3. Shaded-relief view of digital elevation model (DEM) of the Bayou L'Ivrogne quadrangle, showing the line of the topographic profile in Figure 4, viewed with Global Mapper DEM viewer.

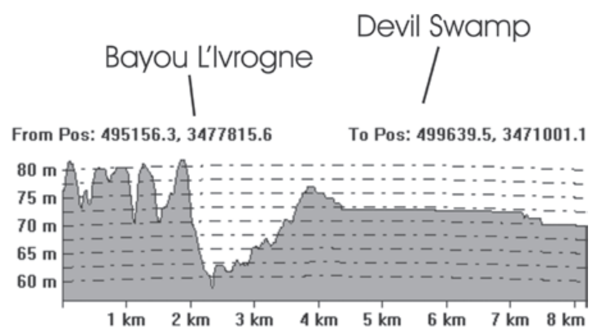


Figure 4. Topographic profile through the area of Andersen's (1993) hypothesized stream capture, along the line shown in Figure 3, showing the positions of Bayou L'Ivrogne and Devil Swamp (constructed with Global Mapper DEM viewer).

Although a conclusive analysis of the possibilities enumerated above may prove elusive at present, the simplest alternatives would appear to be (1) that given by Andersen (1993) of straightforward stream capture, but allowing for some apparent modifications of the drainage patterns by their exploitation of zones of systematic fractures; and (2) that of drainage anomalies deriving purely from fracture control, with no actual episode of capture. In other words, although some sort of uplift may have occurred and may even have played a role in the development of the anomalous drainage patterns, it does not appear to have been necessary, i.e., the difference in base level between the Red River and the headward portion of the Calcasieu River system may account for the entire elevation difference between Bayou L'Ivrogne and Devil Swamp without invoking uplift. Incision of the Devils Creek drainage at a less-rapid rate than than that of Bayou L'Ivrogne could account for the bermlike feature in the gap between them.

Acknowledgements

R. Hampton Peele contributed interested discussion of the individual points set forth in the narrative, and of their varying combinations in the alternate scenarios considered, when the author first began examining the 7.5-minute DEMs encompassing the area of Andersen's (1993) posited stream capture.

References

Andersen, H. V., 1992, Geologic map of Natchitoches Parish: Baton Rouge, Louisiana Geological Survey, scale 1:62,500 (Plate 1 of Geological bulletin no. 44).

Andersen, H. V., 1993, Geology of Natchitoches Parish: Louisiana Geological Survey, Geological bulletin no. 44, 227 p. plus plates.

Rectilinear Aspect of the Eastern Valley Wall of the Mississippi River, Western Florida Parishes, Southeastern Louisiana

Richard P. McCulloh

The eastern valley wall of the Mississippi River at the western edge of the Florida parishes, southeastern Louisiana, is traditionally depicted as consisting of gently curving segments–with the single exception of the straight, nearly N-S-trending segment defining the western edge of the city of Baton Rouge. On various types of imagery and on 7.5-minute topographic maps, however, the valley wall shows a decidedly rectilinear character. The first depiction of a straight linear segment, or lineament, coincident with the valley wall was by Fisk (1944, his figure 6), for approximately the southern 60 percent of the valley wall along the edge of Pleistocene uplands in the western Florida parishes (Figure 1). (Lineaments, or linear surface features inferred to reflect geologic structure, in this context are significant in potentially representing zones of fracturing, either with displacement [faults] or without it [joints].) Sources of data and map information more recent and with better resolution than those available to Fisk indicate that lineaments can be interpreted in places along the valley wall farther north to at least the boundary with southern Mississippi.

On the thematic-mapper satellite image included in the Louisiana GIS CD, version 2.0 (Braud et al. 1999), the valley wall in many places appears defined by a number of lineaments–the longest of which, in northwestern West Feliciana Parish, is 16 km (10 mi) long (Figure 2).

A mosaic of LIDAR ("Light Detection And Ranging") digital-elevation-model (DEM) images downloaded from the Atlas website (http://atlas.lsu.edu) shows essentially the same lineaments (Figure 3), though they differ somewhat in detail from those discernible on the satellite image. (On this mosaic, only the easternmost extent of the longest lineament interpreted from the satellite image in Figure 2 is captured, because most of that lineament extends beyond the current western edge of LIDAR coverage.) Other details not obvious on the thematic-mapper image are also visible, such as the straight, north-northwest-trending stream valley that appears as a possible continuation of a Mississippi River valley-wall lineament in the northern portion of the image.

On the St. Gabriel 7.5-minute topographic quadrangle, the Highland Road escarpment at the eastern valley wall of the Mississippi flood plain gives a clear impression of straightness along a segment approximately 9 km (5.6 mi) long Figure 4).

Traditional curvilinear renderings of the valley wall necessarily obscured the rectilinear aspect considered here. The previous depictions of curvilinear segments may have derived in part from long-standing cartographic protocols for generalization considered appropriate to a particular scale, as well as from actual differences in the resolution of map data themselves.

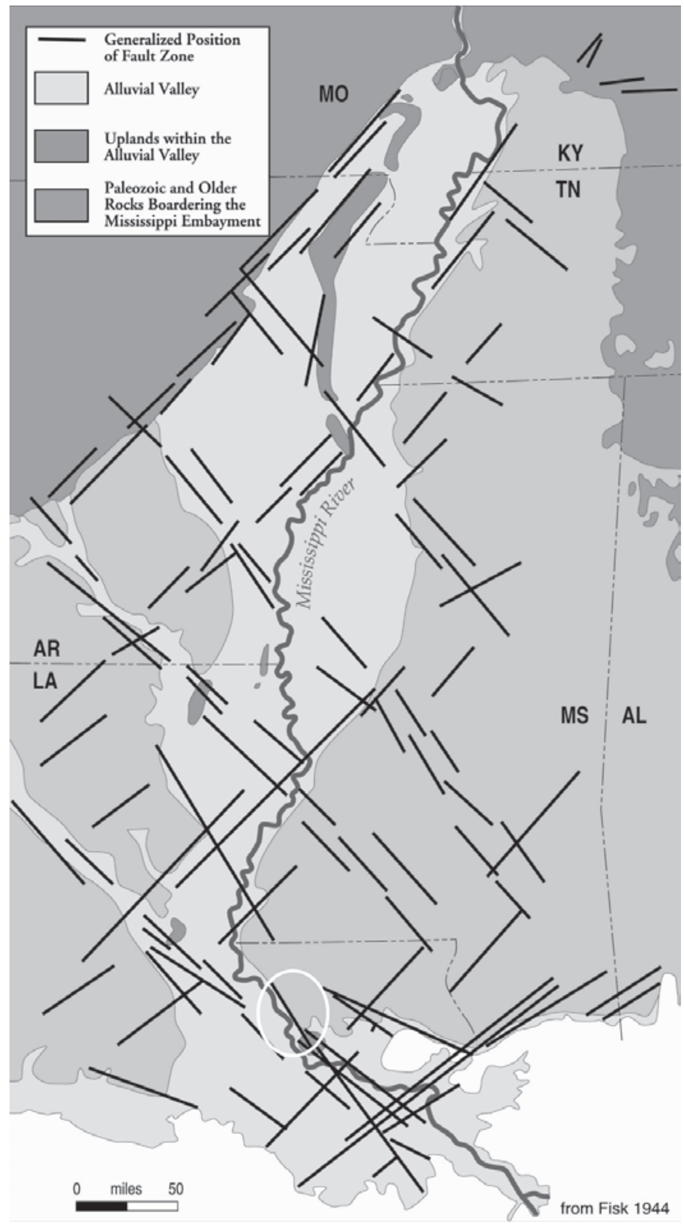


Figure 1. Lineaments interpreted by Fisk (1944). The lineament-bounded portion of the eastern valley wall of the Mississippi River referred to in the text is indicated with an elliptical outline. (Redrawn and adapted from Fisk 1944, his figure 6.)

References

Braud, D., R. H. Peele, B. Aleti, E. Ozdenerol, F. Jones, R. Cunningham, R. Paulsell, J. Snead, D. Gisclair, and D. Davis, compilers, 1999, Louisiana GIS CD: A Digital Map of the State, Version 2.0: prepared for Office of the Governor, Louisiana Oil Spill Coordinator's Office by Louisiana State University, Department of Geography & Anthropology, Baton Rouge, Louisiana Applied & Educational Oil Spill Research & Development Program. (Two compact discs.)

Fisk, H.N., 1944, Geological investigation of the alluvial valley of the lower Mississippi River: Vicksburg, Mississippi, U.S. Army Corps of Engineers, 78 p. plus plates.

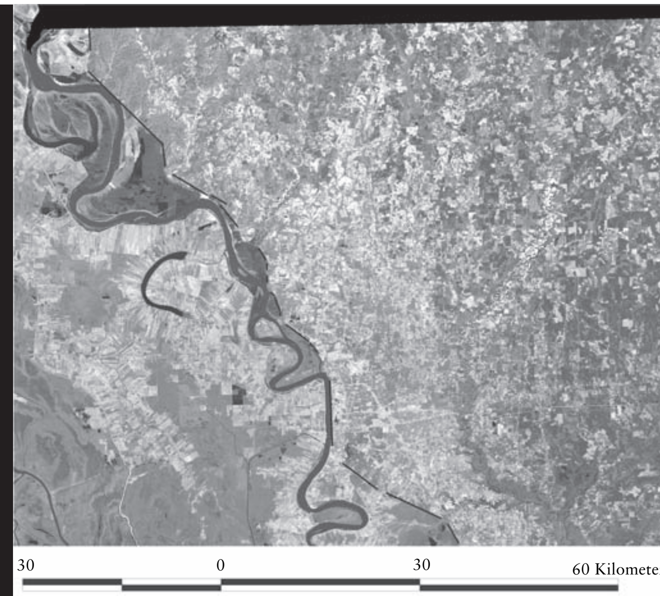


Figure 2. The thematic-mapper satellite image included in the Louisiana GIS CD, version 2.0 (Braud et al. 1999), suggests that the valley wall at the eastern edge of the Mississippi River flood plain in the western Florida parishes has a distinctly rectilinear character. Lines mark interpreted straight linear segments (lineaments) coincident with the valley wall; the longest of these, in northwestern West Feliciana Parish, is 16 km (10 mi) long.

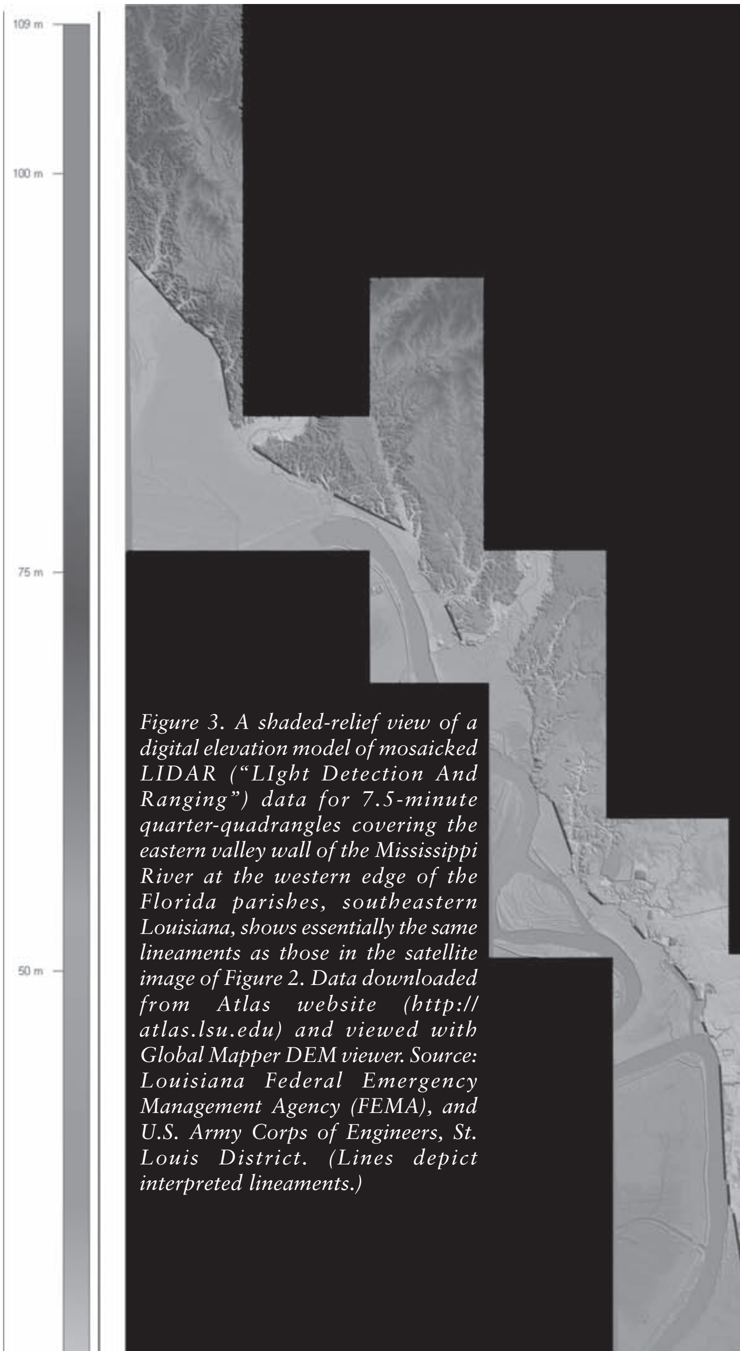


Figure 3. A shaded-relief view of a digital elevation model of mosaicked LIDAR ("LIght Detection And Ranging") data for 7.5-minute quarter-quadrangles covering the eastern valley wall of the Mississippi River at the western edge of the Florida parishes, southeastern Louisiana, shows essentially the same lineaments as those in the satellite image of Figure 2. Data downloaded from Atlas website (http://atlas.lsu.edu) and viewed with Global Mapper DEM viewer. Source: Louisiana Federal Emergency Management Agency (FEMA), and U.S. Army Corps of Engineers, St. Louis District. (Lines depict interpreted lineaments.)

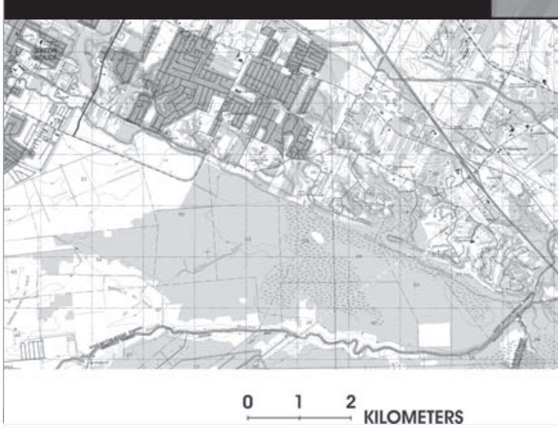


Figure 4. Portion of the St. Gabriel 7.5 minute topographic quadrangle, showing a comparatively straight segment of the Highland Road escarpment approximately 9 km (5.6 mi) long at the eastern valley wall of the Mississippi flood plain.

New Research Contracts

Resource Assessment of the In-Place and Potentially Recoverable Deep Natural Gas of the Onshore Interior Salt Basins, N. Central and NE Gulf of Mexico is the title of a new research project funded by the U.S. Department of Energy and is a subcontract from the University of Alabama to LGS/LSU. Ron Zimmerman (LGS) is collaborating with Don Goddard (Center for Energy Studies) and Ernest Mancini (University of Alabama) on this project. Total project funding is for $979,818 for a three-year term with the LGS/LSU subcontract portion [North Louisiana Interior Salt Basin] averaging approximately $92,882/year over three years.

Project objectives are targeted to perform resource assessment of the in-place deep (>15,000 feet) natural gas resource of the North Central and Northeastern Gulf of Mexico Interior Salt Basins. Petroleum system identification, characterization, and modeling will be used to estimate the volume of the in-place resource that is potentially recoverable. The research will be directed primarily at aiding industry's future deep-gas exploration efforts by identifying those areas with high potential to recover commercial quantities of the deep-gas resource.

Geologic Review 2003-2004 is a continuing contract with the Louisiana Department of Natural Resources for which John Johnston III, is the principal investigator. The total funding for this project (October 1, 2003 to September 30, 2004) is $95,500. Under this project, LGS will provide specific and general geologic and engineering advice to the Department of Natural Resources, Coastal Management Division (CMD) and to the U.S. Army Corps of Engineers (COE) as requested on matters regarding oil and gas exploration and production in the area of interest. The area of interest is defined as all areas within the jurisdiction of the CMD plus that of the U.S. Army Corps of Engineers New Orleans, Galveston, and Vicksburg districts.

Compilation, Design, and Production of a 2nd edition of the Atchafalaya Basin Map: The Louisiana Department of Natural Resources has funded LGS for this one-year project (July 1, 2003 to June 30, 2004) for a total of $24,280. The deliverable is a revised and updated version of a similar map titled "Map and Satellite Image of the Atchafalaya Basin" produced by LGS for the Atchafalaya Basin Commission in 2000, which proved to be a very popular and much-in-demand item. The new map will contain improved cartographic symbolization and design and the latest satellite digital photographic mosaic of the Atchafalaya Basin. John Snead, Robert Paulsell, and Lisa Pond are the LGS cartographers working on this project.

Other shorter-term research projects being carried out at LGS include:

Calendar for the LUMCON/Barataria-Terrebonne Natural Estuary Program: Funded by LUMCON/BTNEP for $2,216. Lisa Pond is the principal investigator (one-month project).

Reprinting of the Louisiana Coastal Zone Map of 2002: Funded by DNR for $6,962. John Snead is the project manager (two-month project).

Research Associate Paul Heinrich is the principal investigator for the following projects:

Study of the Geomorphology and Geoarchaeology of the Lake Killarney Ecosystem Restoration Project: Funded by Coastal Environments, Inc. for $3,000 (three-month project).

Kansas Lane Project, Monroe, LA: Funded by Earth Search for $960 (one-month project).

Study of the Geomorphology and Geoarchaeology of the Indian Bayou North Project Area, St. Landry Parish, LA.: Funded by Coastal Environments, Inc. for $3,324 (nine-month project).

Study of the Natural Setting of the Bon Secour Natural Wildlife Refuge Survey Area, Baldwin County, Al: Funded by R. Christopher Goodwin and Associates for $1,200 (three-month project).

Conferences and Presentations

Gulf Coast Association of Geological Societies Annual Convention

The 53rd Annual GCAGS Convention, hosted by the Baton Rouge Geological Society (BRGS), was held from October 22-24, 2003, in Baton Rouge. The convention was attended by over 700 registrants including professionals, exhibitors, students, and spouses. LGS staff who worked on various aspects of the convention were Ann Tircuit (Registration), Jeanne Johnson (Advertising), Dave Pope (General Chairman), Ron Zimmerman (Exhibits Chair), Riley Milner (Informarion Brochure Chair), LGS Cartographers (Convention Signs), Reed Bourgeois (Posters), Rick McCulloh (Exhibits Security), and Chacko John (GCAGS President). All the papers presented were also published in the GCAGS *Transactions,* Volume 53, 2003. The following papers authored/co-authored by LGS staff were presented at the convention:

- **B. Miller and P. Heinrich:** ***Hydrocarbon Production and Surface Expression of the China Segment of the Tepetate Fault Zone, Louisana.***
- **R. Milner:** ***Chicot Aquifer in Jefferson Davis Parish, Louisiana.***
- **D. A. Goddard and R. K. Zimmerman:** ***Shallow Miocene and Oligocene Gas Potential, Southeast Louisiana's Florida Parishes.*** (An adaptation of the paper is available on the LSU Center for Energy Studies website at www.enrg.lsu.edu/publications/online/shallowgasreport.pdf.)
- **C. J. John, B. L. Jones, B. J. Harder, R. J. Bourgeois, and M. B. Miller:** ***Field Studies in the Chandeleur sound Area, Offshore Louisiana (State Waters).***
- **P. V. Heinrich:** ***Geologic Significance of the Fractured and Shocked Quartz Associated with a Rimmed Circular Depression in St. Helena, Parish, Louisiana.***
- **D. Carlson and R. Milner:** ***A Preliminary Examination of the Hydrology of the Sparta Aquifer and Adjacent Aquifers in North Central Louisiana.***
- J. Bunnell, R. Bushon, W. Orem, R. Finkelman, **B. Hanson, D. Carlson,** and R. Shi: ***Investigating a Possible Link Between Water From Aquifers Containing Lignite Deposits and Kidney Disease in the USA: Louisiana Project.***

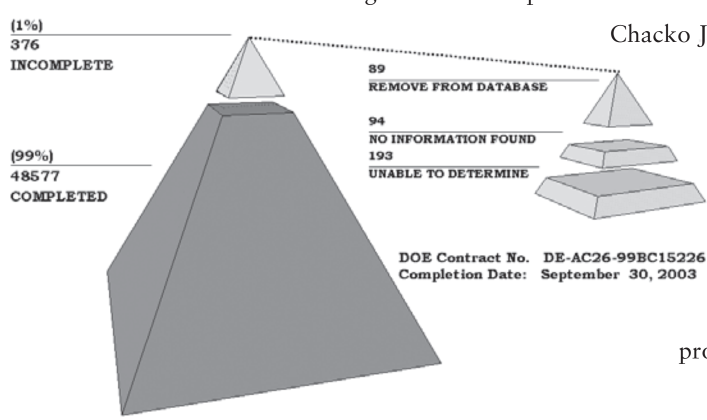
- J. H.Wrenn, W. C.Elsik, and **R. P. McCulloh:** ***Palynologic Age Determination of the Catahoula Formation, Big Creek, Sicily Island, Louisiana***
- **R. Zimmerman** co-chaired a technical session with D. Goddard titled ***"Subsurface and Field Studies"***.
- **C. Breland, Jr.,** co-chaired a technical session with P. Bart titled ***"Seismic/ Sequence Stratigraphy and Modeling"***.
- **C. John,** chaired a technical session titled ***"Gas and Carbonate Studies"***.

The 10th International Petroleum Environmental Conference was held in Houston, November 11-14, 2003. John Snead of LGS presented a paper at the Conference titled ***"Pipeline Mapping in Louisiana"***.

LGS Completes DOE Funded Misising Well Location Project

Recognizing the need for digital coordinates for use in all current and future Geographic Information Systems (GIS) and geologic mapping programs used to facilitate exploration and production activities, the LGS set out to update the information in the Department of Natural Resources, Office of Conservation (DNR/OC) computerized system. The LGS has completed a four-year project to create a digital database of the locations from various public records. Locations for 48,953 well permits missing from the DNR/OC computerized system were sought. This project, **Missing Well Locations: An Environmental Risk Assessment and Regulatory Problem for Louisiana,** was funded for $1,088,000 under U.S. Department of Energy contract **DE-AC26-99BC15226.**

The LGS, with the cooperation of the DNR/OC, obtained the paper records of each well permit. Using various purchased commercial oil and gas, mapping and surveying software, and data management programs (GeoGraphix, Arcview, AutoCad Map and ProCogo), a digital latitude and longitude for each of the missing wells was obtained. Through careful examination the LGS was able to obtain locations for 48,577 permits of the 48,953 that were missing coordinates. The study determined that 89 permits were erroneously listed in the existing database and therefore should be removed from the database. As a result of incomplete and illegible information, coordinates could not be determined for 193 permits, and no permit records were found for 94 wells. The newly created database is now available in both digital and hard-copy format. The completed digital data was uploaded into the DNR/OC Sonris well database in early October 2003.



Chacko John was the project manager and Brian Harder was the principal investigator for the contract and they were assisted by Byron Miller, Bobby Jones, Reed Bourgeois, former LGS employee Philip Lemay, and student intern Christopher Troy. The LGS would like to thank Mike Killeen, Dave Elfert, and Bo Blackman of DNR/OC for their advice and assistance, Jim Rack and the staff at Geodata who provided the hard copies, and John Fenstermaker, and Fenstermaker and Associates for his and their assistance with some of more problematic location data.

Personnel News

Edwin "Bud" Millet, LGS Cartographic Supervisor, retired October 6, 2003 after 33 years of state and LGS service. A retirement luncheon was held in his honor on October 3, 2003 and LGS Director Chacko John presented him with a plaque of appreciation for his dedicated service to the Louisiana Geological Survey.

Continuing the LGS School Outreach Activities, Riley Milner and Brad Hanson visited Farrah Benedetto's and JoAnne Garland's fourth-grade classes at Bernard Terrace Elementary School in Baton Rouge, LA on October 13, 2003. Both classes were participating in Earth Science Week 2003 activities, and their presentations to the students discussed the geologic history, general geology of Louisiana, and what a geologist does as a career. Both classes were very enthusiastic and interested in geology and other earth science disciplines.

New Publications

Geological Pamphlet Series

R. P. McCulloh, P. V. Heinrich, and J. I. Snead, 2003, ***Geology of the Ville Platte Quadrangle Louisiana (To Accompany the Ville Platte 30 x 60 minute Quadrangle):*** Louisiana Geological Survey, Geological Pamphlet #14, 11p. $5.00.

Geologic Quadrangle Map Series (1:100,000)

Richard P. McCulloh, Paul V. Heinrich, and John Snead, with field support from Whitney Autin, 2003, ***Ponchatoula 30 x 60 minute Geologic Quadrangle:*** Louisiana Geological Survey, $10.00.

Paul V. Heinrich, John Snead, and Richard P. McCulloh, 2003, ***Crowley 30 x 60 minute Geologic Quadrangle:*** Louisiana Geological Survey, $10.00.

Report of Investigation Series

#03-01 Doug Carlson, Riley Milner, and Brad Hanson, 2003, ***Evaluation of Aquifer Capacity to Sustain Short and Long-Term Ground Water Withdrawal From Point Sources in the Chicot Aquifer for Southwest Louisiana: Part 1:*** Louisiana Geological Survey, 90 p. plus appendix, $65.00.

Note: a new updated LGS Publication List with revised publication costs is now available. The publication list will also be accessible on the LGS website, www.lgs.lsu.edu. Call Patrick O'Neill at (225)578-8590 to order LGS publications or e-mail him at pat@lgs.bri.lsu.edu.

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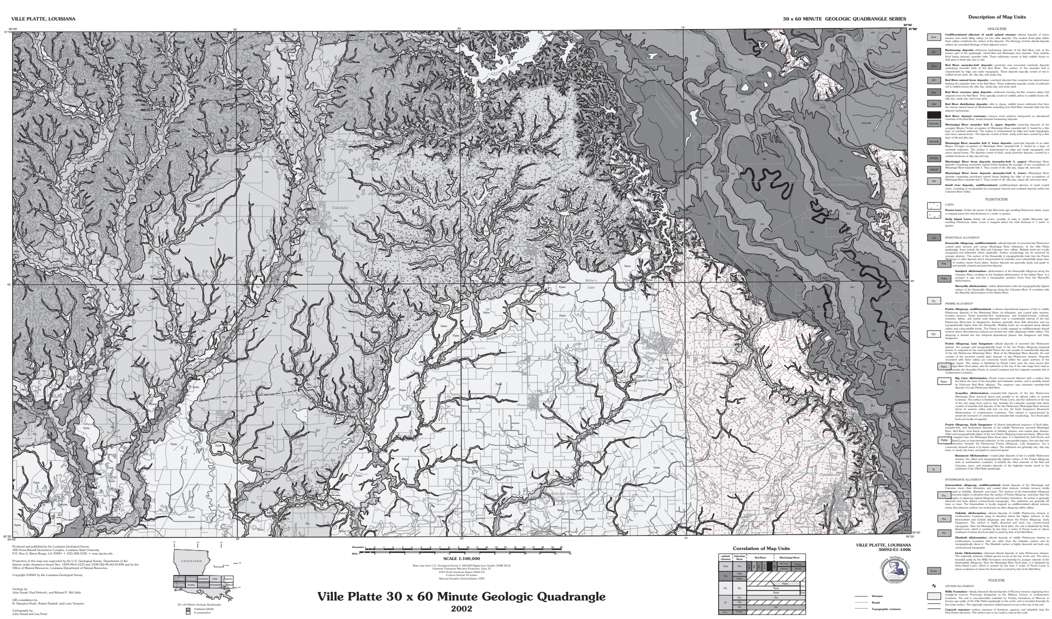

Ville Platte 30x60 minute geologic quadrangle, 2002, Louisiana Geological Survey

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