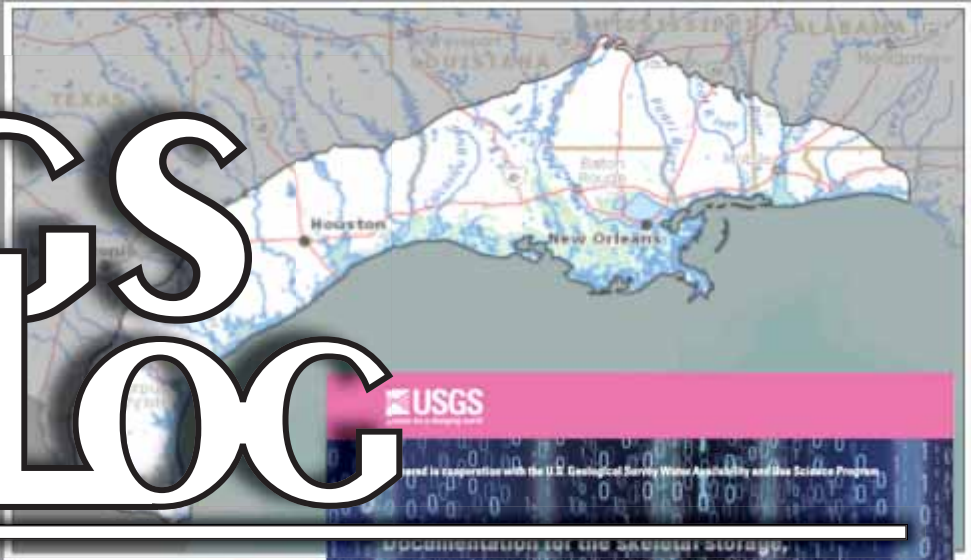


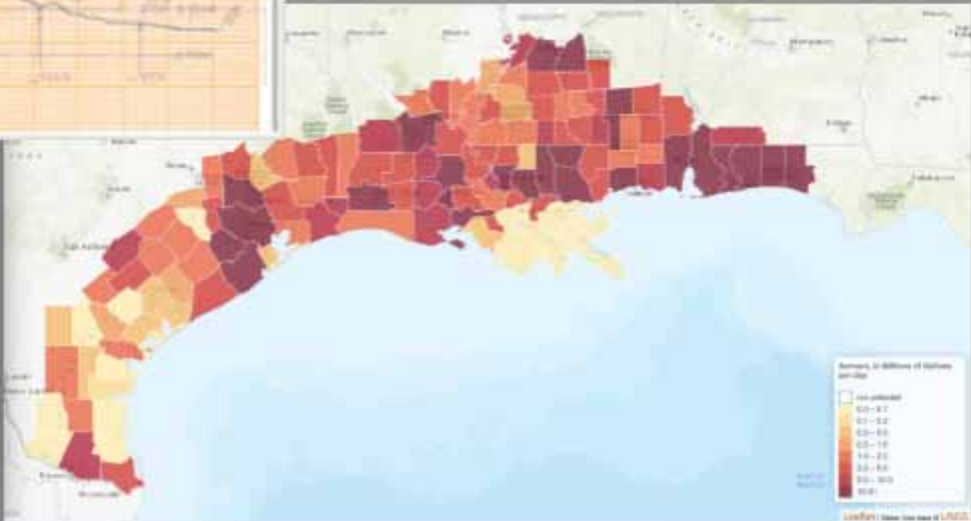
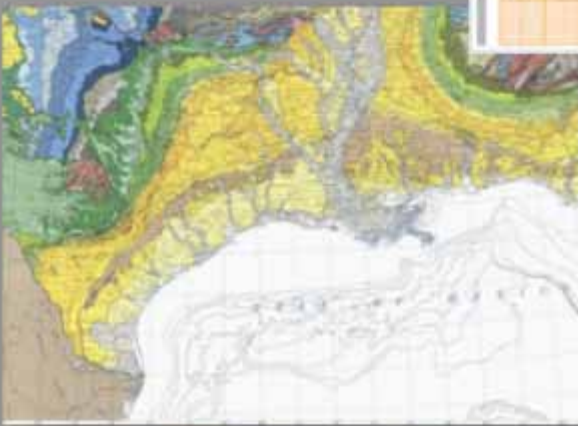
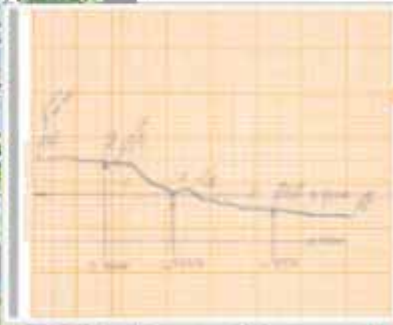
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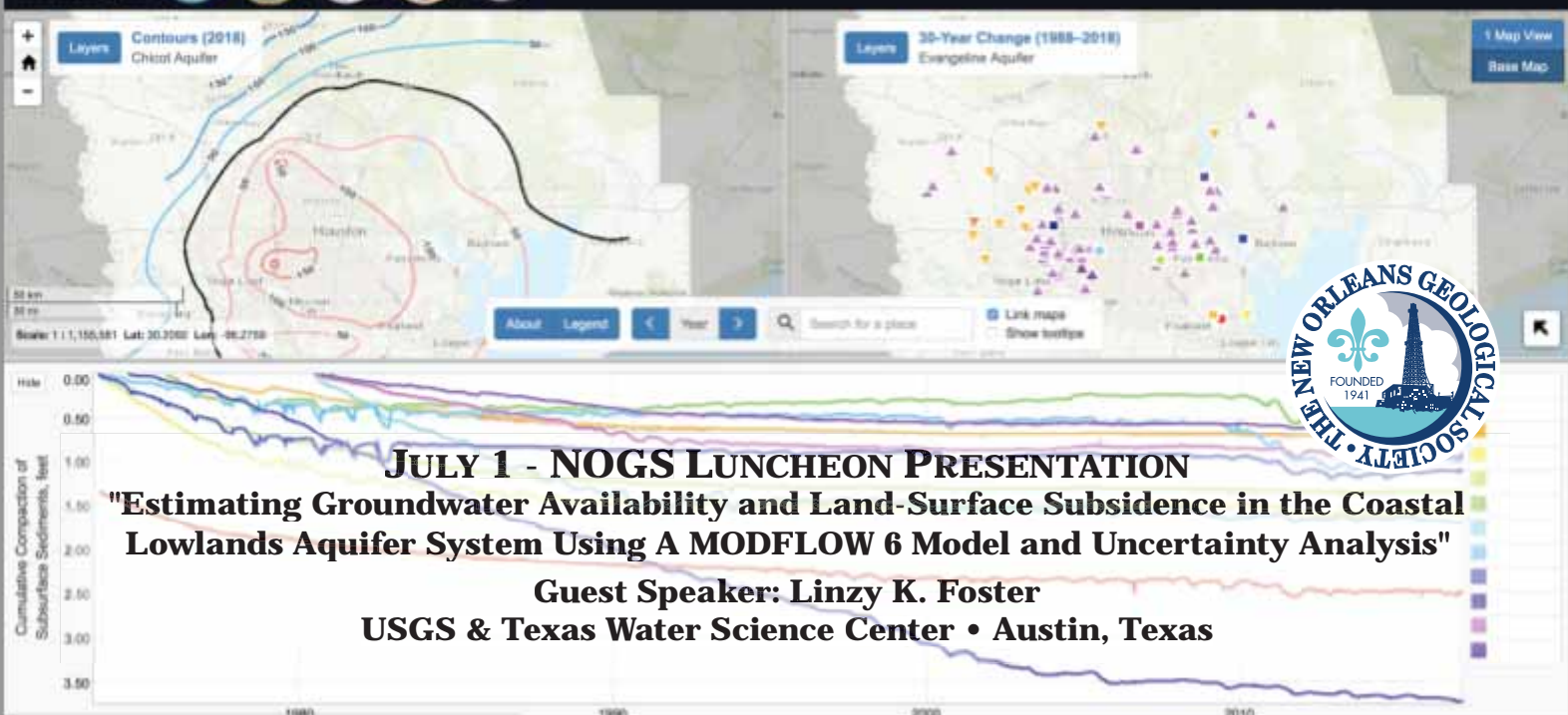
Volume 60, Number 1



Documentation for the Aquifer Storage, compaction and subsidence (CSUB) Package of MODFLOW 6
Chapter IX of Section A, Groundwater Book 5, Modeling Techniques



What is Subsidence? Subsidence Viewer Data Processing Publications



JULY 1 - NOGS LUNCHEON PRESENTATION

"Estimating Groundwater Availability and Land-Surface Subsidence in the Coastal Lowlands Aquifer System Using A MODFLOW 6 Model and Uncertainty Analysis"

Guest Speaker: Linzy K. Foster

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Technical Symposium

August 26-28
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**New Orleans Downtown Marriott
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Published monthly by the New Orleans Geological Society. This issue was sent to press on June 26, 2019.

Interested in contributing to the NOGS LOG?

Please submit items by the 1st Friday of the month to nogseditor@gmail.com. Advertising requests should contact NOGS at admin@nogs.org.

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on the cover

Cover by: *Linzy K. Foster*

Montage showing information from July 1 NOGS Luncheon Presentation

"Estimating Groundwater Availability and Land-Surface Subsidence in the Coastal Lowlands Aquifer System Using A MODFLOW 6 Model and Uncertainty Analysis"

Guest Speaker: Linzy K. Foster

USGS & Texas Water Science Center
Austin, Texas

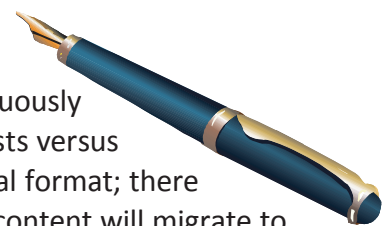


Study area and cross-section of Coastal Lowlands Aquifer System (CLAS)

Foster, L.K., Clark, B.R., Duncan, L., Houston, N., and Teeple, A., 2018, Developing a Regional Model of the Coastal Lowlands Aquifer System (CLAS): presented at Louisiana Water Resources Commission Meeting, Baton Rouge, LA., July 25, 2018

http://www.dnr.louisiana.gov/assets/OC/env_div/gw_res/Events/WRCMtgsPresentations/LWRC_CLAS_July2018.pptx.pdf (accessed 17-Jun-19).

From the Editor



Either we evolve, or we fade into irrelevance and/or die. NOGS is evolving, continuously and necessarily. Beginning with the August 2019 Volume 60, No. 2, *NOGS LOG*, costs versus revenue have risen to the point that the *NOGS LOG* will be published only in digital format; there will be no hard copies. Where appropriate it is likely that some of the *NOGS LOG* content will migrate to the NOGS website for logistical and other reasons.

Finally, thank you Fran for doing a great job (again, and as always).

Paul Post
NOGS LOG Editor



FROM THE PRESIDENT **ROBERT ROONEY**

Greetings to all NOGS members.

It is a pleasure and an honor to communicate with you in a monthly address as President of the New Orleans Geological Society. It is not necessary to say that our Society, like many other professional societies, presently face fiscal challenges that can put executive boards to the test. The NOGS Board in June elected to cease hardcopy production of the *NOGS LOG*, but will continue publishing the on-line PDF version, which is available for download from the NOGS website.

As a geoscientist who has made a living in the oil patch, I can say as many of you can as well – it is not always easy. As I write this letter, oil closed at \$51.28 WTI, \$60.35 Louisiana light, and natural gas at \$2.38. When I graduated from UNO in 1986, oil prices were in the \$12-\$15 range, and the industry was falling hard following the boom; so, from that starting point, I have a built-in sense of optimism where I like to view disappointments in the rear-view mirror, and upside ahead! For me, the oil patch has always held a sense of security in knowing that if I work hard and keep a positive outlook, things will eventually work out. I might think of the oil patch as a very demanding parent who loves unconditionally but demands patience, perseverance, and hard work. The oil field is an open frontier where wealth is created, ideas can be turned into untold opportunity, and there is always room for one more. Still, it is difficult when industry downturns take a financial toll on careers and finances. I have been there. At those times, it is good to be able to reach out to fellow geoscientists in a social setting where like-minded individuals can share camaraderie and advice. Sometimes casual discussions can lead a person to new opportunities. Speaking from experience, I encourage our membership to take every opportunity to socialize at NOGS events in support of our members and our great organization.

NOGS membership also includes many geoscientists involved in the environmental and coastal sciences, working hard to keep our Louisiana coastlines and industrial operations sustainable. Having recently worked as a consultant exploration geoscientist in South Louisiana for the last 2 ½ years, and having over 30 years of industry experience, it is my opinion that the geologist of the future needs to be both an explorationist and an environmentalist. It is critical that a Louisiana geological society such as NOGS recognize the importance of both disciplines through educational and technical programs that reach

out to the rest of our industry and to the community in which we live. I hope to be able to be a part of helping our Board of Directors continue the good work that NOGS makes possible, and to help grow our membership in an age of rapid advancements in technology in oil and gas exploration frontiers.

I want to thank the outgoing Board: Chris McLindon, who closed out the 2018-19 term as both President and Vice-president, and continues to serve the Society and the Louisiana community through his sharing of his geological talents in oil and gas exploration and in educating the public by sharing his valuable work on South Louisiana Coastal geology; Shara Gremillion who served as Secretary has been a steadying force on the Board and consistently volunteered her time and efforts to the Society's activities including serving as an all-day golf course volunteer in support of NOGS Children's Museum fundraiser; Fran Weisman served as Editor which says it all to anyone who has served in that post in the past, Fran's dedication, hard work, persistence in gathering and editing the needed materials for publication, and her service and participation at social events were very much appreciated; David Culpepper as Treasurer who has made great strides in getting our finances organized and put into Quick Books, which is a standard format being adopted by many of the GCAGS societies; Alex Janevski who had to end his Presidency due to a career move to New Mexico; Director Jennifer Connolly who served her third and last term and will be working as Nomination Chairman for 2019-20; Brenda Reilly served as Nominating Chairman and has been a consistent and dedicated volunteer and participant in various NOGS events throughout the year; David Reiter served as Director and on various committees including the Golf Tournament committee where he was an invaluable resource in keeping the committee organized and focused; Chuck Holman who served as Director, consistently providing valuable insight to the board, and both Dave and Chuck will be continuing into the next term; and special thanks to our Administrator Christy Himel who has worked through the details of modernizing NOGS online presence, as well as providing the administrative support to our luncheons and Board of Directors meetings and being the on-site organizer for our major social events.

The 2019-2020 Board members are John Dribus as President-elect, Dave Culpepper who is serving a second term as Treasurer, Toby Roesler as Vice President, Sheri Richardson as Secretary, Paul Post as Editor, Charles Miller as Editor-elect, Allan Melillo as in-coming Director 2022, and David Reiter and Chuck Holman as continuing Directors.

I am looking forward to meeting you at upcoming NOGS events and meetings. I encourage you to invite your colleagues as guests and future members, and I look forward to meeting you throughout the year.



Robert Rooney

Distinguished Member of the House

Edward Beauregard Picou, Jr.

Citation: To Edward Beauregard Picou, Jr. for his decades of dedicated service to the House of Delegates and for his many contributions of excellence to AAPG activities.



Ed was a “day student” at Louisiana State University and in his freshman year was fortunate to schedule Physical Geology I. This course was taught by Henry V. Howe, who established the Department of Geology. Dr. Howe showed how wonderful and diverse the discipline geology is. Needless to say, Ed pursued geology as his curriculum. Again, he was fortunate to study Gulf Coast geology under Dr. Grover E. Murray. Both these professors demonstrated strong reasons why it is essential to participate in professional organizations.

After a two-year stint on active duty in the US Army, which was mostly spent in Korea just after the armistice, he joined Shell Oil Company as a paleontologist. During his 34-year career, he had assignments in Baton Rouge, Lafayette, Houston and New Orleans. However, the majority of these years involved working with staff in the offshore Gulf of Mexico. Early at Shell, he was influenced by Jules Braunstein and joined the local geological society and eventually served as president and director. Ed was on many committees for the AAPG and GCAGS conventions held in New Orleans. In addition to these organizations, he is active in many other geoscience organizations.

Ed has been a member of AAPG for 64 years and represented the New Orleans Geological Society as

delegate in three stints from 1980 through 2000. He was Chairman for the Rules and Procedures Committee in 1994. Other AAPG activities include participating in the Correlation of Stratigraphic Units of North America (COSUNA), joined the AAPG Foundation Trustee Associates in 1994, received Distinguished Service Award in 1999, was Association Treasurer 2000-2002, received Honorary Membership in 2002. Ed served on the GeoCare Insurance Committee 2002-2005, appointed a Vice President to the Board of AAPG/Datapages in February 2005, and was appointed regional team leader for the AAPG Foundation Campaign *Meeting Challenges-Assuring Success*, 2006-2008. In 2007, Ed through the AAPG Foundation, established a Named Grant for an LSU Graduate Student.

Now in his 28th year of retirement from Shell, he maintains an active association with the New Orleans Geological Society by assisting in publication of the monthly *NOGS LOG* and chairs of the Historical and Publications Sales Committees. Owing to his long-time involvement with the Society, he has earned the moniker “Mr. NOGS.”

William M. Whiting





NOGS Contact Information

Email: admin@nogs.org • Website: www.nogs.org

5500 Prytania Street • #604 • New Orleans, LA 70115.

Correspondence and all luncheon reservations should be sent to the above address.

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July 1 • NOGS Luncheon Presentation

Holiday Inn Downtown Superdome

\$3.00 validated parking in hotel garage

Presentation:

Estimating Groundwater Availability and Land-Surface Subsidence in the Coastal Lowlands Aquifer System Using A MODFLOW 6 Model and Uncertainty Analysis

Guest Speaker:

Linzy K. Foster

USGS & Texas Water Science Center • Austin, Texas

See page 8 for Abstract and Biography

HOLIDAY INN DOWNTOWN SUPERDOME

Check with concierge or
front desk for location.

Lunch served at 11:30 am

ADMISSION:

With reservation..... \$30.00

Without reservation \$35.00

Student Member with reservations..... FREE

August 5

NOGS Luncheon Presentation

Speaker & Topic: To Be Announced

Holiday Inn Superdome • New Orleans, Louisiana

**VOLUNTEERS
NEEDED!**

September 28

Girl Scouts B.I.G. Event

9:30 am - 2 pm • Louisiana State University (LSU) • Baton Rouge, Louisiana

For more info: Tom Bergeon • 504-832-2772 • tom.bergeon@upstreamexp.com

August 26-28

23rd Annual

Gulf of Mexico Deepwater Technical Symposium

N.O. Downtown Marriott Convention Center • New Orleans, Louisiana

For more information: <http://www.deepwatermola.org>

October 12

Energy Day

Louisiana Children's Museum • New Orleans, Louisiana

For more info: Tom Bergeon • 504-832-2772 • tom.bergeon@upstreamexp.com

**VOLUNTEERS
NEEDED!**

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Continued from previous page

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July 1 NOGS Luncheon Presentation

☆☆☆ at the Holiday Inn Superdome ☆☆☆

Estimating Groundwater Availability and Land-Surface Subsidence in the Coastal Lowlands Aquifer System Using A MODFLOW 6 Model and Uncertainty Analysis

Presented by

Linzy K. Foster

USGS & Texas Water Science Center • Austin, Texas

ABSTRACT

The vast Coastal Lowlands Aquifer System (CLAS), one of the principal aquifers of the United States, underlies the coastal regions of Texas, Louisiana, Mississippi, Alabama, and the panhandle region of Florida. In 2016, the U.S. Geological Survey began a 5-year study focused on understanding groundwater availability, water budgets, land-surface subsidence, and the value of the existing monitoring-well network in the CLAS. A new MODFLOW 6 groundwater model is in development to gain a better understanding of this aquifer system and enable predictions of quantities of interest (QoIs) such as water levels, land-surface subsidence, and base flow in streams. These QoIs will be estimated using uncertainty quantification (UQ). First-Order Second-Moment analysis (also known as linear analysis) capabilities built into the USGS PEST++ and pyEMU suite of software will be used to develop an initial posterior ensemble of model parameters and predictions of QoIs. The UQ is being used to guide next steps in development by quantifying changes in predictive uncertainty resulting from a specific model update. UQ estimates will be improved with the use of the new iterative ensemble smoother algorithm in PEST++. QoIs will be evaluated for baseline conditions as well as different combinations of anthropogenic and climate scenarios.

Several models of the CLAS have been developed in the past few decades on both regional and local scales. Model parameter and groundwater withdrawal information from these models are being used to inform the prior information for the UQ of the new MODFLOW 6 model and to provide water-use information for the model. The new model is based on current (2019) understanding of the hydrostratigraphic units of the Chicot, Evangeline, and Jasper aquifers in the study area. The model incorporates information obtained

from work done in 2017 by Intera Geoscience and Engineering Solutions in Texas, USGS datasets in Louisiana, and other datasets for the aquifer system published since the previous Regional Aquifer System Analysis (RASA) investigations of the 1990s. Information on the current conceptualization of the model, datasets used in development of the model, and next steps of model development and UQ will be discussed in this presentation.

BIOGRAPHY



Linzy K. Foster is a Civil Engineer with the U.S. Geological Survey (Texas Water Science Center) in Austin, TX. She has a B.A. in Mathematics from Maryville College and a M.S. in Civil Engineering from Auburn University. Her research focuses on numerical modeling of groundwater systems, density-dependent groundwater-flow modeling, contaminant transport modeling, and improving the use of models through application of uncertainty analysis. She has been with the Texas Water Science Center since 2012 and prior to Texas, was with the USGS in Fort Lauderdale, Florida from 2008-2012. Outside of groundwater modeling, Linzy's research also focuses on development of scripts and processes to automate data processing and model workflows using the Python scripting language.

**THE JULY LUNCHEON RESERVATION
DEADLINE IS JUNE 28.**

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NOGS Took the Field and Promoted Geology at the STEM Core Element Baby Cakes 2019 Event!

The New Orleans Geological Society joined 35 other STEM organizations for a career event May 14th, 2019 at the Shrine on Airline. Over 4,500 students from grades 5-8 were involved in the day's activities! The students were treated to a Baby Cakes baseball game and many presentations throughout the stadium including NOGS "How an Oil Field Forms in 6 Easy Steps".

Our engaging volunteers were Karlien Meulenaars, Doug Bradford, Mike Anderson, Bernie Regel, Jim Brooks, Dave Cope, and Tom Bergeon.

Students had many great questions, and were exposed to a very comprehensive view of petroleum geology.

Major thanks to everyone who made this such an affective program!!

Three volunteer events are coming up this fall: KEEP YOUR CALENDARS OPEN!





Photography by Bernie Regel and Jim Brooks



CALENDAR OF EVENTS: JULY - DEC 2019

If you know of upcoming seminars or academic events that may be of interest to our members, please email the event details to Fran Wiseman at nogseditor@gmail.com to be included in the monthly calendar.

2019	EVENT	LOCATION	CONTACT / INFO
1 Jul	NOGS Luncheon Presentation Speaker: Linzy Foster • USGS & Texas Water Science Center "Estimating Groundwater Availability and Land-Surface Subsidence in the Coastal Lowlands Aquifer System Using A MODFLOW 6 Model and Uncertainty Analysis"	Holiday Inn Superdome	Reservations: www.nogs.org Email: admin@nogs.org Call: 504-348-3500
5 Aug	NOGS Luncheon Presentation Speaker & Topic: To Be Announced	Holiday Inn Superdome	Reservations: www.nogs.org Email: admin@nogs.org Call: 504-348-3500
26-28 Aug	23rd Annual Gulf of Mexico Deepwater Technical Symposium	N.O. Downtown Marriott Convention Center	http://www.deepwaternola.org/
9 Sept	NOGS Luncheon Presentation Speaker & Topic: To Be Announced	Holiday Inn Superdome	Reservations: www.nogs.org Email: admin@nogs.org Call: 504-348-3500
28 Sept	Girl Scouts B.I.G. Event 9:30 a.m. - 2 p.m.	LSU - Baton Rouge, LA	Tom Bereon • 504-832-3772 tom.bergeon@upstreamexp.com
7 Oct	NOGS Luncheon Presentation Speaker & Topic: To Be Announced	Holiday Inn Superdome	Reservations: www.nogs.org Email: admin@nogs.org Call: 504-348-3500
12 Oct	Energy Day	LA Children's Museum	Tom Bereon • 504-832-3772 tom.bergeon@upstreamexp.com
19 Oct	New Orleans Pelicans and New Orleans Saints Chevron STEM Fest Benefiting Core Element	10 am - 2 pm Mercedes-Benz Superdome	https://core4kids.org/team-view/join-core-element-the-n-o-pelicans-saints-for-stem-fest-presented-by-chevron-october-20
4 Nov	NOGS Luncheon Presentation Speaker & Topic: To Be Announced	Holiday Inn Superdome	Reservations: www.nogs.org Email: admin@nogs.org Call: 504-348-3500
2 Dec	NOGS Luncheon Presentation Speaker & Topic: To Be Announced	Holiday Inn Superdome	Reservations: www.nogs.org Email: admin@nogs.org Call: 504-348-3500

~ In Memorium ~

JAMES WALTER SWANEY, JR.

May 23, 1946 - June 1, 2019

James Walter Swaney, Jr. passed away peacefully at the age of 73 on Saturday, June 1, 2019. He was born on May 23, 1946, in Pittsburg, PA. He is survived by his three children Brian (Ruby) Swaney, Tracie (Bryan) Bruno, Ashley (Ryan) Gernon and his six grandchildren. He is preceded in death by his father, James Walter Swaney; mother, Evelyn Shontz Swaney, and his wife Gwenn Murrah Swaney.

Jim graduated from the University of Pittsburg with a bachelors in Geology. He went on to work in oil and gas industry for many years before transitioning to the Department of Interior with the federal government. He was a NOGS member and served as Treasurer 2008-09. Jim was very driven in his career and loved the work he

did. More recently his passion had become volunteering at EJGH and his grandchildren. Jim will be missed by all those who knew him.

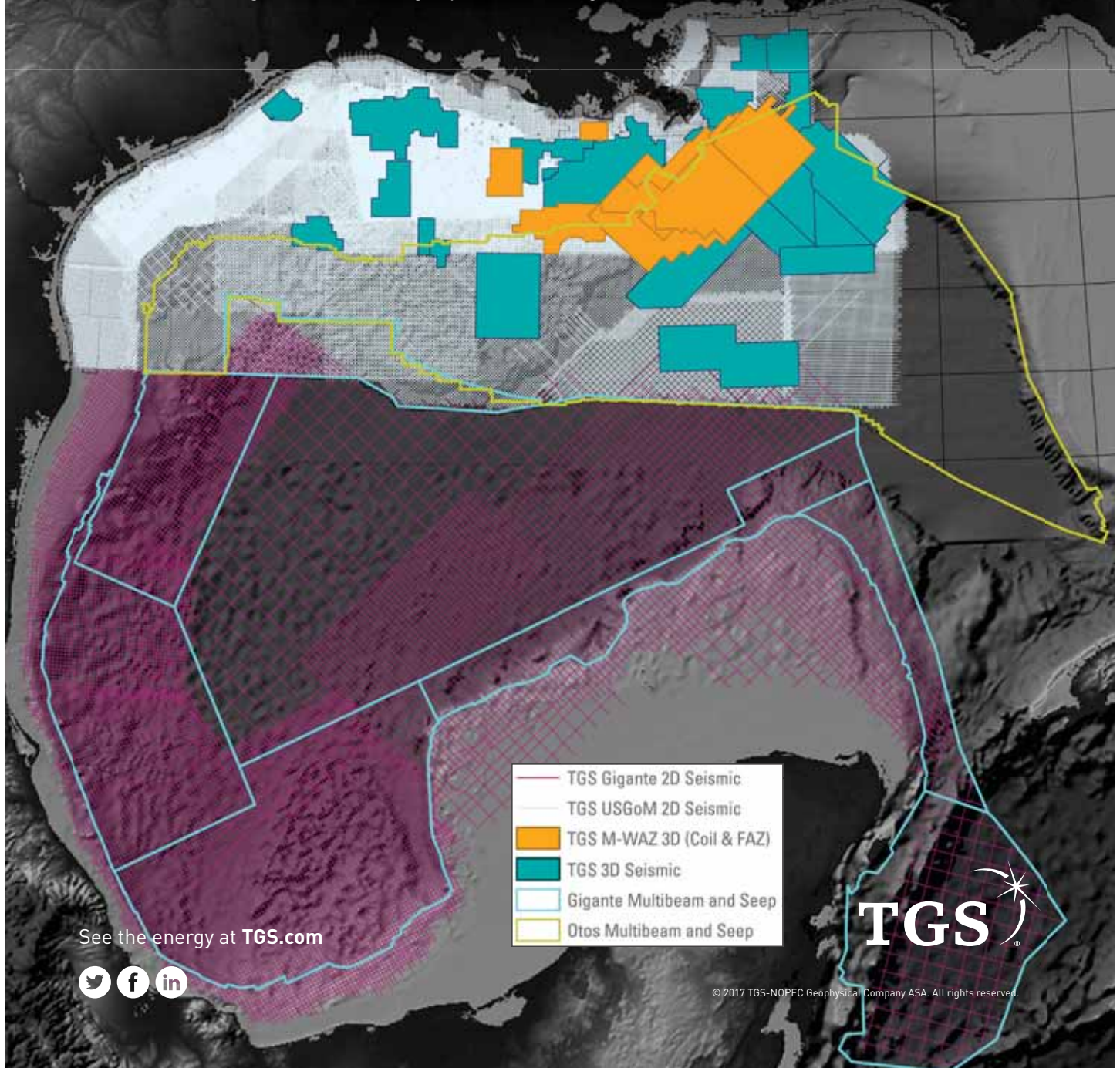
Funeral services were held Thursday, June 13th at Lake Lawn Metairie Funeral home, 5100 Pontchartrain Blvd., New Orleans, with a short prayer service that began at 11:45 a.m. In lieu of flowers, donations can be made to St. Jude Children's Research Hospital, www.stjude.org. Friends and relatives are invited to sign the guestbook at www.lakelawnmetairie.com.

Published in TheNewOrleansAdvocate.com from June 10 to June 13, 2019



Set your sights. **Gulf of Mexico**

TGS provides industry-leading offshore seismic data using an innovative mix of technologies and unmatched imaging capabilities. Through strategic partnerships, we provide a comprehensive collection of advanced marine acquisition technologies for enhanced reservoir delineation, characterization and monitoring. TGS delivers the E&P industry unlimited potential with our collection of advanced offshore data including **Declaration M-WAZ 3D** survey, **Fusion M-WAZ 3D**, **Otos Multibeam and Seep** and **Gigante 2D Multibeam and Seep** programs. Explore the Gulf of Mexico with the right data, in the right place, at the right time.





During **May 2019**, the U.S. Department of the Interior Bureau of Safety and Environmental Enforcement (BSEE) approved **111** Gulf of Mexico (GoM) **Twenty-three** were for shelf wells, and **83** ls. Of these, there were **9 new well permits: 6 in deepwater.**

The 6 deepwater new well permits were all for exploration wells. Two permits were to **Chevron U.S.A.** for **Garden Banks 913 #1** and **Mississippi Canyon 651 #2**. **LLOG Exploration Offshore** received a permit for **Mississippi Canyon 816 #3**. **Talos Energy Offshore** obtained a permit for **Green Canyon 21 #1**. **Murphy Exploration & Production** was awarded a permit for **De Soto Canyon 4 #2**, and **Shell Offshore** obtained a permit for **Atwater Valley 198 #1** well.

On May 31, **IHS-Petrodata** reported that the total GoM mobile offshore rig supply stood at **72, 1 higher** than last month. The marketed rig supply consisted of **42** rigs, of which **35** were under contract. The marketed rig supply and contracted rig supply numbers also increased **1 compared**

with last month. The marketed contracted versus total rig supply utilization rate stood at **58.3%**, and the marketed contracted versus marketed supply utilization rate stood at **83.3%**. By comparison, the May 2018 total fleet utilization rate stood at 43% (**versus 48.6% today**) with 34 of the 79 rigs then available under contract.

As of May 31, **Baker Hughes** (which tracks rigs actually drilling, not those engaged in completions or workovers, etc.) reported **23** active mobile offshore rigs in the GoM (Figure1), which is **65.7%** of the rigs under contract mentioned above. This active rigs number is **2** more than reported last month. Of the 23 rigs, **5** are located on the **shelf**, and **18** are drilling in **deepwater**. At the same time last year, there were 18 mobile offshore rigs operating in the GoM, the 23 units drilling represents a **27.8% increase** in active rigs year-over-year.

Baker Hughes total U.S. rig count on May 31 stood at **984** rigs, **7 fewer** rigs than reported at the end of April 2019. Of the 984 rigs, **800 (81.3%)** are **“oil” rigs** and **184 (18.7%)** are **“gas” rigs**. A year ago, there were 1060 rigs working in the U.S. Thus, the current rig figure represents a **7.2% decrease** in rigs year-over-year. **Texas** always has the largest number of rigs currently with **480**, slightly under half (48.8%) of the total number of rigs in the U. S. **Louisiana** has a total of **64** rigs, up **2** rigs from last month. The majority are working in

LOCATION	AREA / BLOCK	WELL
1	VERMILLION 385	# 1
2	SHIP SHOAL 28	# 41
3	SOUTH TIMBALIER 311	# A-4
4	GARDEN BANKS 913	# 1
5	MISSISSIPPI CANYON 651	# 2
6	MISSISSIPPI CANYON 816	# 3
7	GREEN CANYON 21	# 1
8	DESOTO CANYON 4	# 2
9	ATWATER VALLY 198	# 1

the Haynesville of northwest Louisiana. In South Louisiana, there were four (4) inland water and five (5) land rigs working (Figure 1).

On May 23, the **U.S. Department of Interior Bureau of Ocean Energy (BOEM)** reported that it had accepted **153**

out of the **227** bids received at **OCS Sale 252**. The BOEM has until **June 18, 2019** to either accept or reject the remaining **74** bids.

The next region-wide offshore lease sale, **OCS Sale 253**, is planned for August 2019.

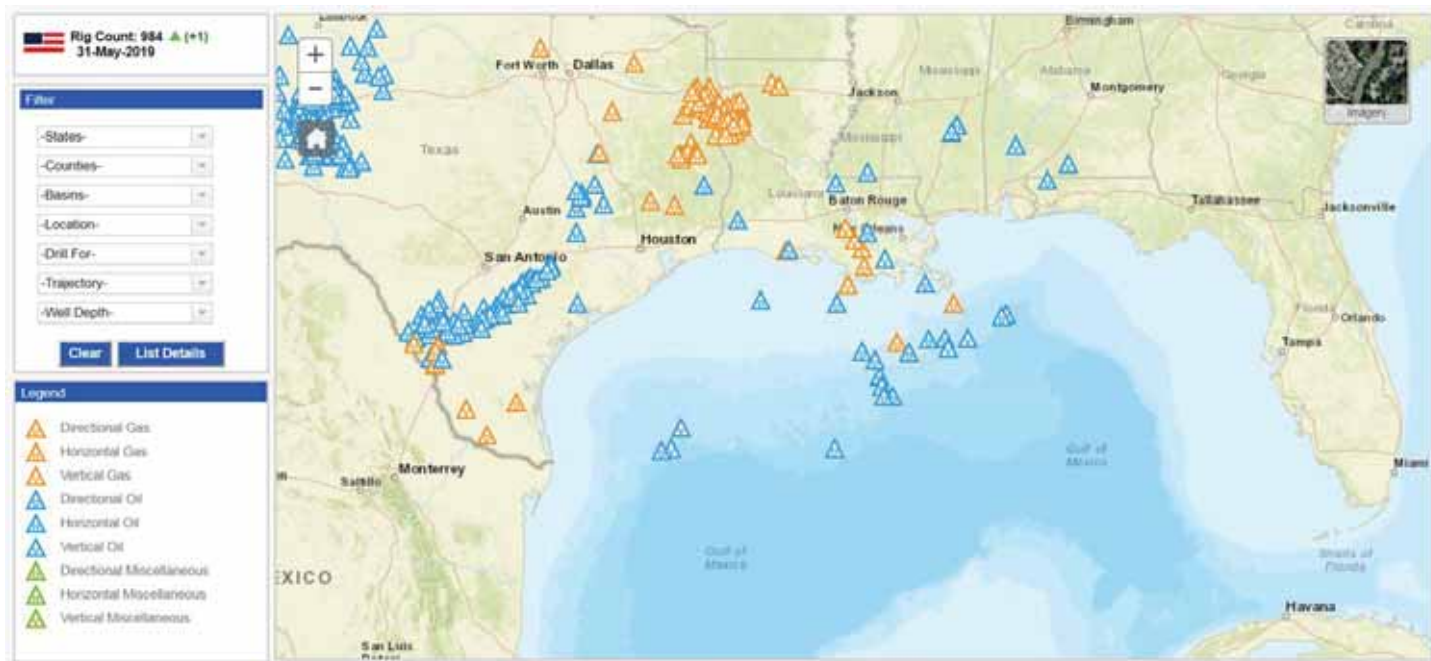


Figure 1. Location and well designation displaying Baker Hughes rig count May 31, 2019

NOTE: These are rigs actually drilling, not performing workovers, completions, etc.

Source: <https://ie.gis.connect.bakerhughes.com/rigcountweb/default2.aspx> (accessed June 1, 2019)

Picture From Our Past...

by Ed Picou - Chairman, Historical Committee

1994-95 NOGS Officers

From left: David McGee, Secretary; Fred Palumbo, Treasurer; Betsy Strachan, Vice President; Ronnie Youngblood*, Director; Mark Gallagher, President and Mike Gallagher, President-Elect - * Deceased





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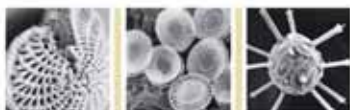
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JUNE 2019 NOGS LUNCHEON Speaker: Ryan Weber



Left: June 2019 NOGS luncheon speaker Ryan Weber (President of Paleo Data Inc., New Orleans, Louisiana) discussing a poster of a key slide from his presentation *Microbiotic Response to the Opening of the Gulf of Mexico: Norphlet, Smackover, and Haynesville* with a NOGS member Liz McDade.

Below: Paleo Data Inc. staff who attended the June NOGS luncheon, left-to-right: Yanbin Lu, Vann Smith, Nicholas Myers, and Aaron Avery attending June NOGS luncheon.





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