



The mission of the Mississippi Department of Environmental Quality is to safeguard the health, safety, and welfare of present and future generations of Mississippians by conserving and improving our environment and fostering wise economic growth through focused research and responsible regulation.

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Mississippi Department of Environmental Quality Environmental News

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DELTA MEETS WELL REPORTING DEADLINE

The Governor's Delta Sustainable Water Resources Task Force recently met a February 1 deadline to collect reports of metered water use in the Mississippi Delta. Last summer many farmers throughout the Delta volunteered to install water meters, agreed to a June 30, 2014, deadline to install them, and a February 1, 2015, deadline to report from those metered wells. Current and accurate information on the amount of groundwater pumped each year will aid the Task Force in finding solutions to the Delta's water quantity problem.

"We were very pleased to see farmers meet this goal. We believe this is an important step in preserving this valuable resource. The Delta continues to demonstrate a commitment to make the voluntary approach successful," said Kay Whittington, Director of MDEQ's Office of Land and Water Resources.





Approximately two million acres in the Delta are irrigated, most with groundwater pumped from the Mississippi River Valley Alluvial Aquifer (MRVA). In 2012, Mississippi State University's Department of Agricultural Economics calculated that irrigation was responsible for almost \$1 billion per year in revenue from row crop agriculture and for a total economic impact of almost \$2 billion per year.

For over three decades, except in the occasional year with unusually high rainfall during the growing season, annual groundwater withdrawals from the alluvial aquifer have exceeded recharge to the aquifer by approximately 200,000 to 500,000 acre-feet. During this same period, groundwater levels in the alluvial aquifer have declined at unsustainable rates.

To ensure that the Delta has adequate water supplies for the future, MDEQ established the Delta Sustainable Water Resources Task Force in 2011 including the Delta Council, Delta F.A.R.M., the Mississippi Farm Bureau Federation, the Mississippi Soil and Water Conservation Commission, the Natural Resources Conservation Service, the Vicksburg District of the U.S. Army Corps of Engineers, and the Yazoo-Mississippi Delta Joint Water Management District. In August of 2014, Governor Phil Bryant signed an Executive Order creating the Governor's Delta Sustainable Water Resources Task Force with the same membership as the Task Force established earlier by MDEQ.

Soon after the original Task Force was formed in 2011, the members determined that finding solutions to the Delta's water quantity problem would require much better information on the amount of groundwater pumped each year. In addition, they agreed that to manage groundwater use efficiently permitted groundwater users need to know how much water they are using.

MDEQ, with support from the Task Force members, implemented a voluntary metering program, with the condition that if any of the following deadlines of the voluntary program are not met, a mandatory program will be implemented:

- By June 30, 2014, a fixed meter must be installed on five percent of all MRVA wells in each county.
- A report of metered water use for five percent of the MRVA wells in each county must be submitted to MDEQ by February 1, 2015.
- By December 31, 2015, a fixed meter must be installed on an additional five percent (a total of ten percent) of the MRVA wells in each county.
- For every meter installed under the voluntary metering program, a report of metered water use for calendar year 2015 must be submitted to MDEQ by February 1, 2016. In addition, an annual report of metered water use for these wells must be submitted by February 1 of each year thereafter.

To meet the December 31 deadline meters must be installed on a total of 454 additional wells, and the following table shows the number of meters that must be installed in each of the counties. DeSoto, Grenada, Tate, and Yazoo counties have met the 10 percent deadline.

County	Additional Meters Needed for 10%
Bolivar	116
Carroll	3
Coahoma	16
Holmes	4
Humphreys	39
Issaquena	5
Leflore	44
Panola	7
Quitman	35
Sharkey	4
Sunflower	91
Tallahatchie	31
Tunica	31
Warren	1
Washington	27



Blue Crab

MISSISSIPPI SEAFOOD SAFETY TESTING PROGRAM REPORT

OCTOBER 2014 – DECEMBER 2014

The Mississippi Seafood Safety Testing Program is a joint effort of the Mississippi Department of Marine Resources (MDMR) and the Mississippi Department of Environmental Quality (MDEQ) to assure the public that seafood is safe for consumption. A Memorandum of Understanding between BP and MDMR, MDEQ, and the Governor's Office provides for monthly sampling and analysis of Gulf seafood and is a continuation of an effort MDMR and MDEQ began in May 2010 in response to the *Deepwater Horizon* oil spill.

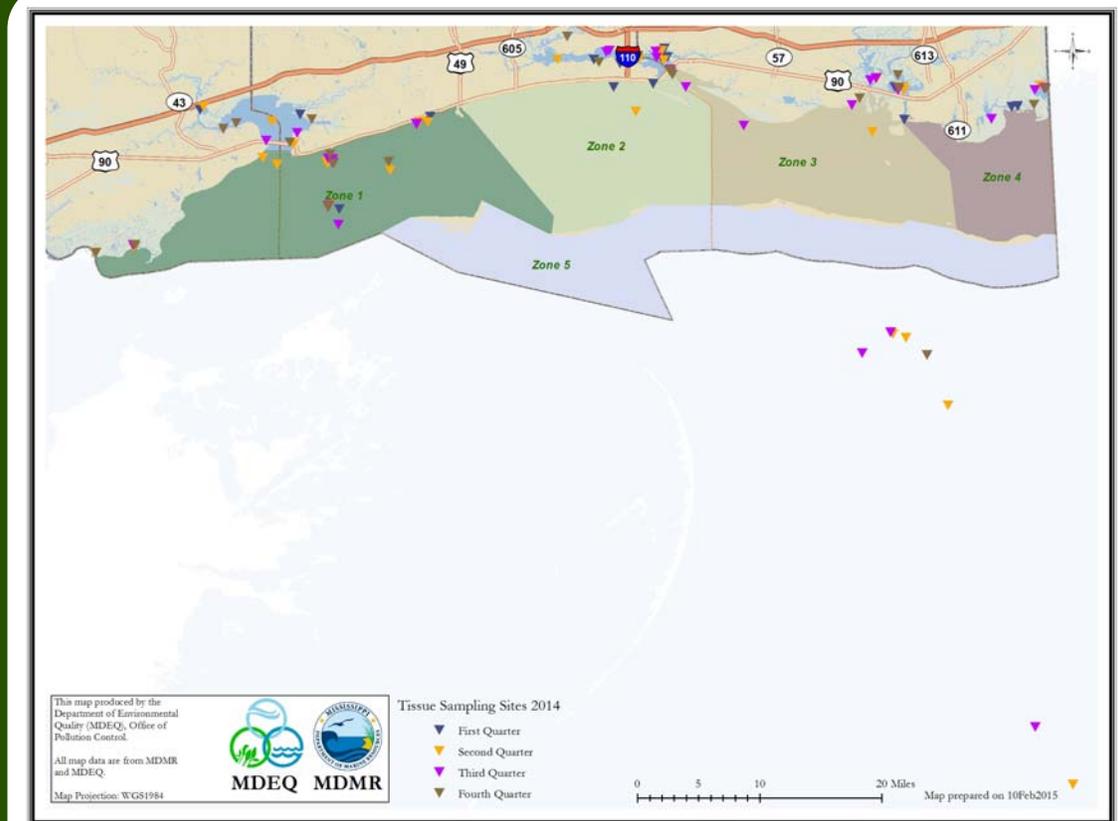
The following fourth quarterly report of the testing program for 2014 summarizes the agencies' efforts and analytical results for October through December 2014.

Seafood Groups and Sampling Procedures

Seafood groups include finfish, shrimp, crabs, and oysters which were identified as the most often groups harvested recreationally and commercially and normally consumed by the public. Finfish species included black drum (*Pogonias cromis*), red drum (*Sciaenops ocellatus*), striped mullet (*Mugil cephalus*), spotted seatrout (*Cynoscion nebulosus*), red snapper (*Lutjanus campechanus*), Spanish mackerel (*Scomberomorus maculatus*), sheepshead (*Archosargus probatocephalus*) and white mullet (*Mugil curema*). Other species sampled were blue crab (*Callinectes sapidus*), white shrimp (*Litopenaeus setiferus*) and oysters (*Crassostrea virginica*).

All samples were collected by MDMR staff in state and federal waters using methods commonly employed in the agency's routine management activities. Fish are collected by gill net or hook and line, shrimp by trawl, crabs by crab pot and oysters by oyster dredge and tong. Finfish are collected at four historically established monitoring stations and four random stations with an effort to collect samples from each of five areas of the Mississippi Sound and south of the Barrier Islands. Because of the variable distribution of shrimp, they were collected opportunistically in the Mississippi Sound east and west of the Gulfport Ship Channel. Crabs were also collected opportunistically east and west of the Gulfport Ship Channel. Oysters are currently collected on two sites, the Pass Christian dredging reef and the Pass Christian tonging reef.

Map of tissue sampling sites in 2014.



The samples were processed by MDMR staff and delivered to MDEQ with chain of custody documents including date of collection and latitude and longitude. The samples consist of approximately 200 grams of edible tissue of each species as identified in the FDA/NOAA/Trustee document *"Protocol for Interpretation and Use of Sensory Testing and Analytical Chemistry Results for Re-Opening Oil-Impacted Areas Closed to Seafood Harvesting."* The fish were filleted, oysters shucked, shrimp headed and peeled, and crabs were backed and the organs and meat were removed. Fish and shrimp tissue samples were wrapped in aluminum foil, then labeled and frozen. Oysters and crabs were placed in jars and samples labeled and frozen. Upon delivery to MDEQ, samples are maintained in a dedicated sample freezer until shipped to the Mississippi State Chemical Laboratory in Starkville. Shipments are made once each month after all samples have been collected and processed.

Sample Analysis and Reporting

Sample analysis conducted by the Mississippi State Chemical Laboratory is performed according to the FDA approved LC-Florescence method for polycyclic aromatic hydrocarbons (PAH). Sample results above the reporting limit will be confirmed by the gas chromatograph/mass spectrometer (GCMS) method. Dispersant testing consists of analysis for dioctyl sodium sulfosuccinate (DOSS), a component of the dispersant used in response to the spill. The analysis is performed according to the FDA/NOAA developed procedure, "New Method for DOSS Detection in Seafood."

Samples collected by MDMR for the last quarter of 2014 included 19 finfish, five shrimp, five crab and six oysters. Results of the analysis for the 35 samples collected during the reporting period indicate all samples pass with no sample results above the levels of concern for PAH as identified in FDA/NOAA/Trustee document "*Protocol for Interpretation and Use of Sensory Testing and Analytical Chemistry Results for Re-Opening Oil-Impacted Areas Closed to Seafood Harvesting*" or DOSS as identified in the Department of Health and Human Services memorandum "*Levels of Concern (LOC)s for Select Gulf Seafood*" dated September 17, 2010.

The December 2014 analysis showed a small detectable amount of acenaphthene (0.0042 ppm, 0.0039 ppm), pheanthrene (0.0017 ppm, 0.0017 ppm), phenanthrene (0.001 ppm, 0.001 ppm) and fluoranthene (0.0055 ppm, 0.0055 ppm) from the finfish. The tissue analyzed came from a single striped mullet caught at the Grand Bay NERR. All amounts recorded are below the Levels of Concern.



Public Information

Seafood safety data are made available to the public through the MDMR Mississippi Seafood Safety Newsletter published on the agency's web site (<http://www.dmr.ms.gov/news-a-events/newsletters>). The data are summarized in a table comparing the maximum level of PAH detected to the level of concern from the FDA/NOAA reopening document. The table below includes the most recent published data through December 2014. A total of 744 samples have been analyzed from May 2010 to December 2014.

Amounts of Detected and Levels of Concern in parts per million (ppm)

	Shrimp		Fish		Crab		Oyster	
	Max Detected	Level of Concern						
Napthalene	0.0127	123	0.0121	32.7	0.0121	123	0.0196	133
Fluorene	0.0193	246	0.0199	65.3	0.0228	246	0.0198	267
Anthracene/Phenanthrene	0.0271	1846	0.0158	490	0.0305	1846	0.01595	2000
Pyrene	0.00366	185	0.006	49	0.077	185	0.0169	200
Fluoranthene	0.00477	246	0.006	65.3	0.0116	246	0.00294	267
Chrysene	ND	132	ND	35	0.000751	132	0.000547	143
Benzo(k)fluoranthene	ND	13.2	ND	3.5	ND	13.2	0.000703	14.3
Benzo(b)fluoranthene	ND	1.32	ND	0.35	0.000644	1.32	0.000727	1.43
Benzo(a)anthracene	ND	1.32	ND	0.35	ND	1.32	0.000628	1.43
Indeno(1,2,3-cd)pyrene	ND	1.32	ND	0.35	ND	1.32	0.00189	1.43
Dibenz(a,h)anthracene	0.000505	0.132	ND	0.035	ND	0.132	0.00209	0.143
Benzo(a)pyrene	ND	0.132	ND	0.035	ND	0.132	0.00291	0.143
DOSS	0.17	500	0.25	100	0.127	500	0.083	500

ND = Non Detected at minimum detection limit of 0.01 ppm prior to July 1, 2010 and after July 31, 2010 or 0.0005 ppm for July 1 thru July 31, 2010 and after Jan 1, 2012

TR = Trace - greater than minimum detection limit of 0.0005 ppm but less than reporting limit of 0.010 ppm

Total Analyzed Samples to Date:

Shrimp	146	5/26/10 - 12/31/14
Fish	301	5/28/10 - 12/16/14
Crab	140	6/10/10 - 12/22/14
Oyster	157	6/09/10 - 12/10/14
Total	744	5/26/10 - 12/31/14



STAFF CHANGES

Lynn Chambers

Lynn Chambers has been named Chief of the reorganized Under-ground Storage Tanks Program. In January 2015, MDEQ consolidated the assessment, cleanup, compliance, and enforcement of Under-ground Storage Tanks (UST) into one program under the Groundwater Assessment and Remediation Division (GARD). This reorganization provides the agency with more efficiency and a primary point of contact on all UST matters.

"I am honored to have been given this opportunity to further our efforts to protect our environment from petroleum contamination and to preserve it for present and future generations of Mississippians," said Lynn Chambers.

In 22 years Lynn has served in a variety of positions at MDEQ. She received a biological engineering degree in 1992 from Mississippi State University and is a Mississippi Registered Professional Engineer and a Board Certified Environmental Engineer.

Natalie Segrest

Natalie Segrest was recently appointed as Chief of the Basin Management Branch within MDEQ's Surface Water Division. The Basin Management Branch protects and restores the quality of Mississippi's water resources by developing and implementing effective management strategies that address water quality issues.

"I am excited to join with our four Basin Managers as we work to engage stakeholders and resource partners to develop watershed plans and on-the-ground initiatives to promote and restore water resources in our state," said Natalie Segrest.

Natalie has been with the agency almost 16 years most recently serving as Water Quality Assessment Chief for the Field Services Division. She is a native of Church Hill, Mississippi, and earned a B.A. in Biological Science from the University of Mississippi.

JEFFERSON PLAZA BROWNFIELD REDEVELOPMENT: A HEFTY RETURN ON PUBLIC INVESTMENT

By Trey Hess, Chris Franovich, and Rebecca Trotter, Groundwater Assessment and Remediation Division

In only 10 years, the redevelopment of the former DeSoto County School Bus Lot into “Jefferson Plaza” has generated approximately \$321,000 in total tax revenue, or a 16.4 percent annualized return on the initial public investment provided through an EPA Brownfield Grant. In many cases, public investment in brownfield redevelopment is considered smart business, particularly when combined with private sector commitment. According to the NorthEast-MidWest Institute Digest Report (2008), every public sector dollar invested in brownfield redevelopment leverages eight dollars in total investment to the site and the surrounding area. Jefferson Plaza is one great example.

Prior to 2002, one of the most visible parcels of land in Hernando was home to the maintenance and parking of the school district’s bus fleet. This prime piece of real estate was underutilized and was generating no sales or property taxes for many years. While commercial development in Hernando skyrocketed and the population surged, this property was stigmatized by environmental concerns related to its past uses.



DeSoto County school bus lot in the 1990s.

At that time, a private developer, Fidelity Development, LLC, became interested in redeveloping the school bus lot into a commercial office park. With the help of MDEQ staff, an EPA Brownfield Grant was used to determine the extent of the environmental issues. A public-private partnership was soon forged among Fidelity Development, DeSoto County, and MDEQ that started the transformation of this section of the Commerce Street business corridor. While MDEQ and DeSoto County worked together to assess the school bus lot using a Brownfield Grant, MDEQ and Fidelity Development were able to reach a Brownfield Agreement to remediate the site allowing Fidelity Development to fund the removal of tanks and the pump house without harm to the local community or the environment. The stigma associated with the contaminated property was lifted, and the 5.21-acre lot now holds more than seven businesses including Community Bank, Waffle House, and several other retail stores located in what is now known as Jefferson Plaza.

This brownfield remediation site has undoubtedly served as a catalyst for economic development and financial stability in the community through the creation of more jobs. The public-private partnership developed among the regulator, local government, and the private sector is an excellent model for neighboring communities and counties in the State of Mississippi to use in their efforts to spur private sector redevelopment of brownfields in their communities.



Same site in 2015 after redevelopment.

FLOWERS NAMED ALUMNUS OF THE YEAR

Top: Dick Flowers with MSU President Mark Keenum.

Below: Flowers with Richard Hopper, Dean, College of Agriculture and Life Sciences.

On February 6, 2015, Richard B. "Dick" Flowers, Sr., was recognized by Mississippi State University's College of Agriculture and Life Sciences as alumnus of the year for his personal, professional, and community achievements. Flowers is a member of the Commission on Environmental Quality. He resides in Tunica and owns Flowers Foundation, Inc.



TURKEY CREEK PATHOGEN TMDL REVISED

MDEQ has developed a new pathogen Total Maximum Daily Load (TMDL) for Turkey Creek located in Harrison County. Turkey Creek flows in a southeastern direction from its headwaters north of I-10 through the Turkey Creek community into Bernard Bayou near Gulfport Lake.

The TMDL process is designed to restore the quality of polluted waters. MDEQ calculates how much capacity a stream has to handle a pollution source and still be acceptable to public health and aquatic life. Fecal coliform bacteria are used as indicator organisms for pathogen bacteria because they are readily identifiable and indicate the possible presence of other organisms that may be in the water.

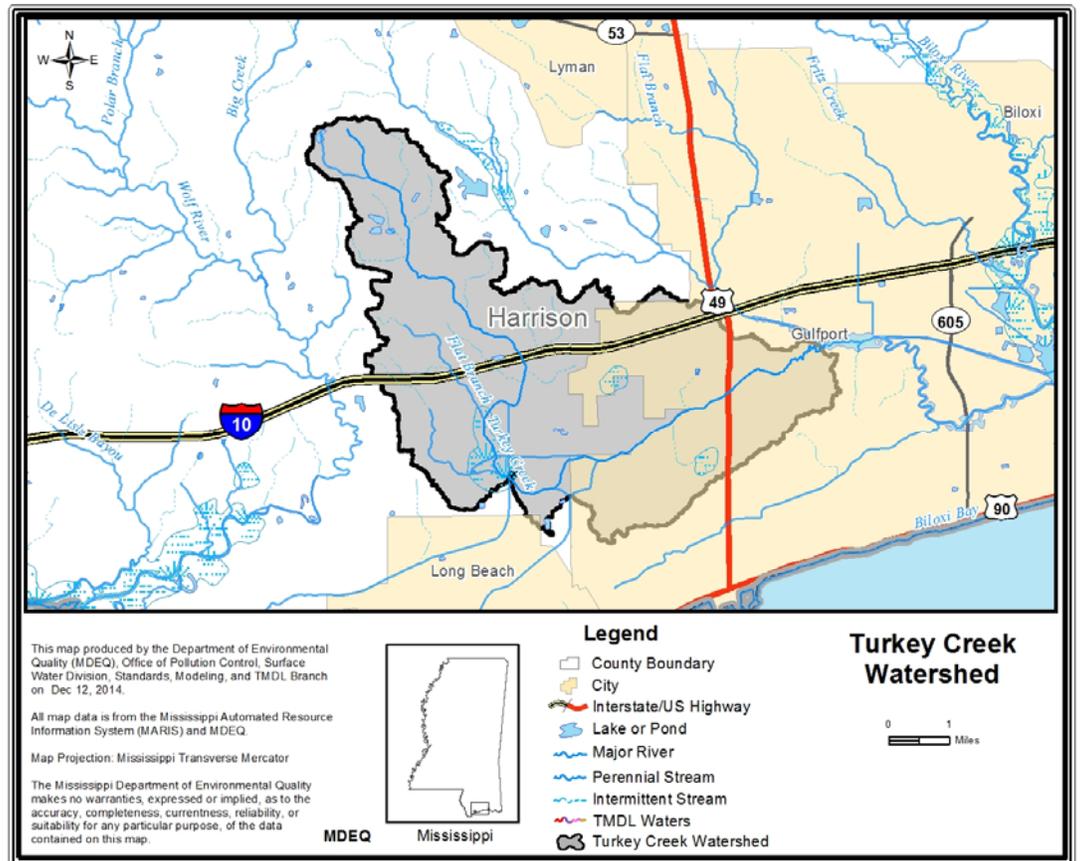
The original TMDL report, completed in 2003, was based on water quality data available at that time. Since then, newer pathogen bacteria data were collected and assessed for this creek, and the revised TMDL shows that there is still a bacteria impairment found in Turkey Creek.

The TMDL contains a source assessment conducted for the Turkey Creek Watershed including nonpoint sources of bacteria from wildlife, livestock, and urban/developed areas, and also nonpoint sources such as failing septic systems and other direct inputs into Turkey Creek. There are three MDEQ permitted point source dischargers referenced in the TMDL with the largest of the three, Dolan's Trailer Park, scheduled to be connected to Gulfport's Waste Water Treatment plant within several months.

MDEQ believes the water quality in Turkey Creek is improving because several of the small sewage treatment plants in the area were connected to the city sewer system and no longer discharge into Turkey Creek. The result of the TMDL shows a bacteria reduction of approximately 80 percent is needed for Turkey Creek to meet Mississippi water quality standards.

MDEQ believes that these bacteria pollution exceedances may be attributed to faulty aging sewer infrastructure (lift stations) and malfunctioning sewer lines near the creek. The TMDL recommends that continued monitoring be performed in Turkey Creek.

Copies of the draft TMDL may be obtained from Mr. Greg Jackson, (gjackson@mdeq.ms.gov) or 601-961-5098.



MDEQ PARTNERS WITH LOCAL GOVERNMENTS TO SPONSOR SPRING 2015 HHW COLLECTION EVENTS

MDEQ is providing grants and technical assistance to a number of local governments throughout the state to sponsor upcoming collection events for household hazardous wastes (HHW). Solid Waste Assistance Grants awarded by MDEQ to these communities will provide funding for the local HHW collection events. These collection events provide local options to properly and safely dispose of aerosols, corrosives, pesticides, herbicides, paints, used oil, batteries, automotive fluids, electronic wastes and other household hazardous materials. The events remove these hazardous materials from the municipal solid waste stream so they are not disposed in local landfills. Local governments that are planning to conduct HHW events that MDEQ is aware of include the following:

Community Sponsor	Planned HHW Event Date
City of Cleveland	April 11
Three Rivers SWMA/ City of Oxford	April 11
Three Rivers SWMA/Lee County	April 18
Harrison County	May 2
Madison County	May 16
Wayne County	May 19

The information listed above represents the best available information at the time of publication. These dates are subject to change and other community events may be added in the near future.

Continued on next page

Contact local city or county officials for more details on these events. Other counties, municipalities and solid waste authorities may apply to conduct HHW events by submitting a grant application by October 1 or April 1 of each funding year through MDEQ's Solid Waste Assistance Grants Program.



For more information on solid waste assistance grants or for a particular event, contact Luis Murillo or Denise Rodgers at 601-961-5171.

SOLID WASTE MANAGEMENT FACILITY ANNUAL REPORTING DUE

The Solid Waste Management Program at MDEQ is reminding the owners and/or operators of all solid waste management facilities that an annual report on the solid waste management or disposal activities conducted during Calendar Year 2014 is due to the agency no later than February 28, 2015. These reporting requirements apply to landfills, rubbish sites, transfer stations, land application sites, processing facilities, composting facilities, and also to beneficial use determinations. The annual report is required pursuant to Mississippi Code Annotated §17-17-219, the Mississippi Nonhazardous Solid Waste Management Regulations, and/or the specific requirements of the solid waste facility operating permit.

Owners and operators may access facility specific reporting notifications and forms online at www.deq.state.ms.us/solidwaste. To access the forms, click on "Solid Waste Reporting" on the left hand side of the page. Otherwise, hard copies of these forms will be mailed to all facility owners and operators in January. Operators are asked to submit two copies of the completed Annual Reporting Form and the supporting information. Forms should be completed and submitted for all solid waste facilities with a valid solid waste management permit or authorization, even if the facility was inactive during the calendar year. Any questions can be directed to Trent Jones at 601-961-5726 or trent_jones@deq.state.ms.us.

The Mississippi Environmental Education Alliance Announces



2015 Teacher Professional Development Workshops

March 10, 2015
Tuesday
9 AM – 3:30 pm



Private Eye

Rankin County Extension Office
601 Marquette Road
Brandon, MS 39042

This is an exciting curriculum that uses a jeweler's loupe to change the scale of investigation and encourage focused, close scrutiny of objects. Students think by analogy about what they see, and theorize as to why what they saw is the way it is. It's a really fun way to investigate things and encourages creative thinking that then can be used across the curriculum. www.the-private-eye.com

Contact Person: Janet Chapman, 601.961.5266

Extension Office, 601.825.1462 (location questions only)

March 12, 2015
Thursday
9 AM – 3:30 pm



Project Learning Tree

Belden Center, Itawamba Community College
3200 Adams Farm Rd.
Belden, MS 38826 (next to Tupelo)



Project Learning Tree (PLT) is an award-winning environmental education program for teachers and other educators, parents, and community leaders working with youth from pre-K through grade 12. PLT uses the forest as a "window into the world" to increase students' understanding of our complex environment; stimulate critical and creative thinking; develop the ability to make informed decisions on environmental issues; and instill the confidence and commitment to take responsible action. www.plt.org

Contact Person: Janet Chapman, 601.961.5266

Itawamba Community College: www.iccms.edu for driving directions

March 31- April 2, 2015
Times TBA

This Coastal birds workshop is embedded in a 3-day **TOTE (Teachers On The Estuary)** workshop jointly sponsored with MMNS and GBNERR. Limited dormitory space is available. Contact Jennifer for details and to register for the complete TOTE workshop, or just Flying Wild.



Flying Wild, a TOTE workshop

Grand Bay National Estuarine Research Reserve
6005 Bayou Heron Road
Moss Point, MS 39562
www.grandbaynerr.org

Through activities involving language arts, social science and math experiences, coupled with community outreach and service learning applications, *Flying WILD* offers a whole-school approach to environmental education using birds as the focus. Targeted for the middle-school audience, though widely adaptable, *Flying WILD* offers practical hands-on classroom and outdoor field investigation experiences connecting real-world experiences in bird biology, conservation and natural history. www.flyingwild.org Contact Person: Jennifer Buchanan, 228.475.7047, Education Coordinator, MDMR's Grand Bay NERR

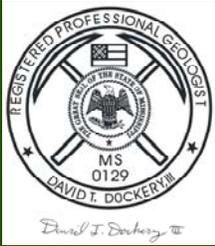
All Participants Receive

- Free CEUs (if desired)
- The workshop curriculum guide
- Lunch and snacks
- Free one year MEEA Membership

How To Register

Pre-register online at www.meea2015workshops.weebly.com. A \$15 pre-registration fee is needed to secure your place. Send your check made out to MEEA to Peggy Guyton, Treasurer, P.O. Box. 43, Mayhew, MS, 39753 (For Flying Wild TOTE workshop, also contact Jennifer Buchanan, 228.475.7047.)

Sponsors: Nonpoint Source Grant from USEPA to MS Dept of Environmental Quality under the provisions of section 319 of the Clean Water Act, MS Coastal Plains RC&D Council, Itawamba Community College, Rankin County Extension Service, US Fish and Wildlife Service, MS Dept of Marine Resources, Grand Bay NERR, and Mississippi Museum of Natural Science (MMNS)



WHEN TUNNEL DIGGERS BECAME FOSSIL COLLECTORS: CONSTRUCTION OF THE JACKSON SEWER MAIN, 1973-1974

By David T. Dockery III, RPG, Office of Geology

The Office of Geology's numbered list of fossil localities contains many construction sites, which were available for fossil collecting for a brief period of time. Fossils from such sites are only found today in old collections. On September 3, 2014, George Phillips of the Mississippi Museum of Natural Science brought two boxes of fossil mollusks (some of which are illustrated in Figure 1), which had been donated to the museum from the collections of Leslie and Sue Pitts. He wanted to verify that the locality information for the boxes was correct. The collection labels were found to be correct based on fossils from the Office of Geology collection, old photographs of the construction site in our photograph collection, and my recollections. The Pitts' collections corresponded to: (1) MGS (Mississippi Geological Survey) locality 7, "Moody's Branch Formation: Sewer excavation across Town Creek ...," and (2) MGS locality 8, "Moody's Branch Formation: Tunnel excavations for sewer" The following is an account of fossils collected at MGS localities 7 and 8 during the construction of the seven-foot-diameter sewer main through South Jackson in 1973 and 1974, an occasion when tunnel diggers became fossil collectors.



Figure 1. Fossil mollusks from the Moodys Branch Formation collected by Leslie and Sue Pitts from the excavation site of the Jackson sewer main in 1974. This collection was donated to the Mississippi Museum of Natural Science. At lower left are the interior and exterior views of the arc shell *Barbatia (Cucullaearca) cuculoides*. Picture was taken by George Phillips on September 8, 2014.

Construction of the sewer main through South Jackson, leading to the sewage treatment plant in Byram, consisted of a tunnel under streets and a deep trench crossing Town Creek and the Pearl River flood plain. Tunnel excavations required underground labor using hand-held chisel-tipped pneumatic diggers to cut through bedrock, a stiff stratum of fossiliferous, clay-rich sands of the Moodys Branch Formation. In late summer of 1973, word came from the site that tunnel diggers had discovered some large fossil shells. Upon visiting the vertical shaft connecting the tunnel to Commerce Street, workers showed me a large specimen of the extinct nautiloid *Aturia alabamensis* (Figure 2,) which they donated to the Mississippi Geological Survey collections. Also among the finds was a small *Aturia* with a broken shell that exposed the interior chambers and spiral tube called the siphuncle (Figure 3). The construction company allowed me access to the tunnel to photograph the fossiliferous strata at the tunnel's working end (Figure 4). Access to the site required climbing down a ladder and walking on rail tracks through a cylindrical corridor of bolted steel plates to the fresh excavation (Figure 5). Spoils excavated from the tunnel were loaded onto dump trucks, transported to the Westbrook Manufacturing Plant, and dumped as fill material on the Pearl River flood plain (Figure 6). Here they provided another fossil collecting opportunity as rainfall exposed the fossil shells on the spoil piles.



Figure 2. *Aturia alabamensis* excavated and saved by tunnel diggers at MGS locality 8. Picture has a film process date of September 1973.



Figure 3. A small broken specimen of *Aturia alabamensis* showing (at right) the interior chambers and siphuncle from MGS locality 8. Picture has a film process date of September 1973.



Figure 4. Fossil shells in the tunnel excavation of the Moodys Branch Formation at MGS locality 8. Picture has a process date of September 1973.

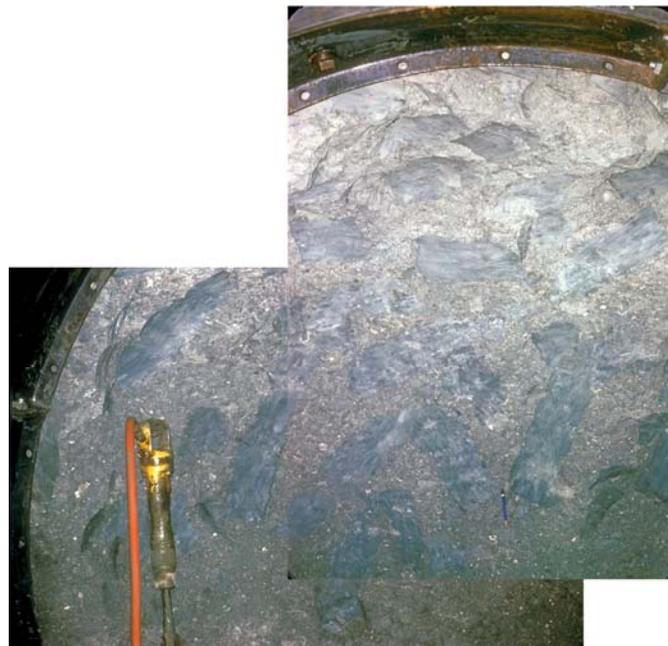


Figure 5. Composite photographs of the end of the tunnel with bolted steel plates against the excavated terminus and the pneumatic digger at lower left and a pencil for scale at lower right. Picture has a process date of September 1973.



Figure 6. Spoil piles of the Moodys Branch Formation adjacent to the Westbrook Manufacturing Plant from the tunnel excavation. Picture has a process date of September 1973.

The main site for fossil collecting (MGS locality 7) was the spoils and walls of the open trench leading to Town Creek (Figure 7). This exposure included the Moodys Branch Formation at the bottom, overlain by unweathered gray Yazoo Clay and then weathered brown Yazoo Clay (Figure 8). Figure 9 shows pictures of the spoil piles with specimens of the arc shell *Barbatia* (one of the species common in the Pitts' collection) and the venericard *Venericardia apodensata* (Figure 9). The prize from the trench site was a rare cypraeid *Jenneria ludoviciana* found in place in the upper Moodys Branch Formation. With this find, the total count of tropical cypraeid species (cowrie shells) from the Moodys Branch at Jackson is ten. These species are illustrated in Figure 10, including, (1) *Cypraeorbis ventripotens* (Cossmann, 1903), (2) *Cypraeorbis towncreekensis* (Dockery, 1977), (3) *Jenneria ludoviciana* Johnson, 1899, (4) *Cypraedia fenestralis* Conrad in Wailes, 1854, (5) *Transovula (Oxycypraea) product* (Dockery, 1977), (6) *Cypraedia (Eucypraedia) multicarinata* (Dall, 1890), (7) *Sulcocypraea healeyi* (Aldrich, 1923), (8) *Sulcocypraea conradi* (Schilder, 1927), (9) *Simnia* sp., and (10) *Sphaerocypraea jacksonensis* (Johnson, 1899).



Figure 7. Sewer excavation and pipe on the north bank of Town Creek. Spoil berms serve as levees to keep out the flood waters of the Pearl River. Picture has a process date of May 1974.



Figure 8. Moodys Branch Formation and Yazoo Clay exposed at sewer excavation (MGS locality 7). Counting ladder steps, the Moodys Branch-Yazoo Clay contact is the 5th step above the water. The upper Yazoo Clay is weathered to a brown color. Picture has a process date of May 1974.



Figure 9. *Venericardia apodensata* (left) and *Barbatia (Cucullaearca) cuculloides* (right) on the spoil piles at MGS locality 7. Picture has a process date of May 1974.

The diversity of tropical taxa, such as cypraeids, is a proxy for ancient sea-water temperature and climate. In this regard, Mississippi has made important contributions to the understanding of Earth's climate history. In Columbia University Press' volume entitled *From Greenhouse to Icehouse, the Marine Eocene-Oligocene Transition* (2003), the molluscan species from both the Jackson Group (Late Eocene containing the Moodys Branch Formation) and the Vicksburg Group (Early Oligocene) in Mississippi are listed. Eleven cypraeid species are listed from the Moodys Branch Formation of the Jackson Group, while only five species are listed from seven formations of the Vicksburg Group. As indicated by this drop in diversity, the Eocene-Oligocene boundary was a transition from a warm planet to a cool planet with the formation of ice sheets over Antarctica (Figure 11).

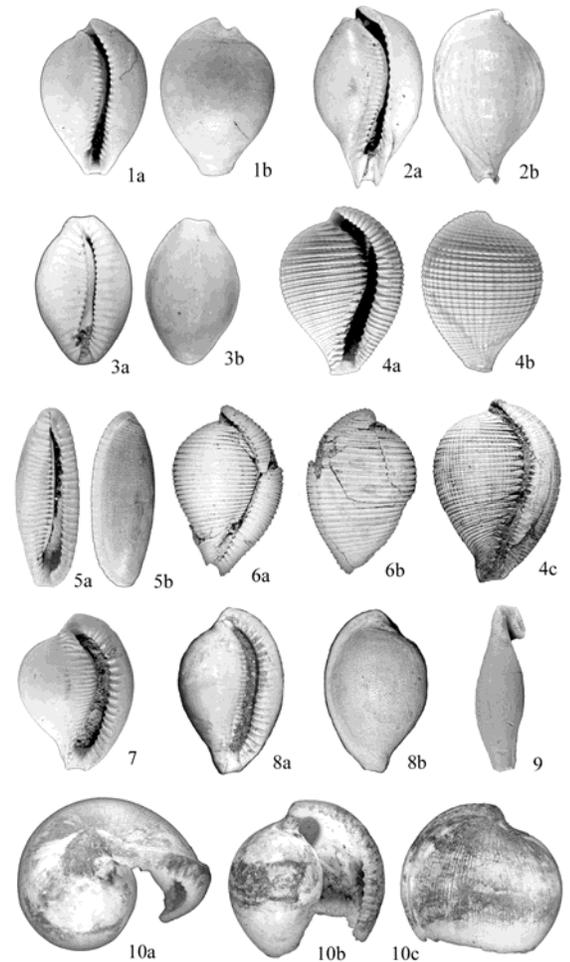


Figure 10. Cypraeid (cowrie) species from the Moodys Branch Formation at Jackson, Mississippi. Specimen images not to scale.

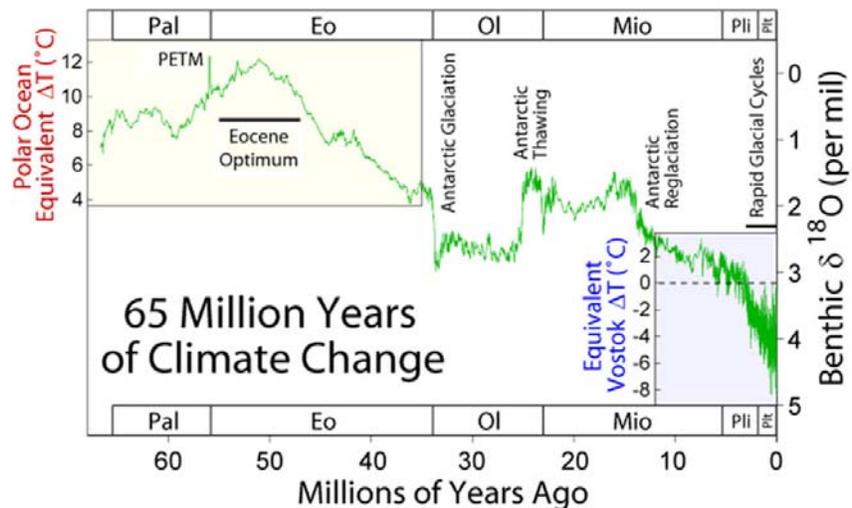


Figure 11. Climate record for the Cenozoic Era from Wikimedia Common. The transition from the warm Eocene Period (Eo) to Antarctic Glaciation in the Oligocene Period (Ol) occurs at the Jackson-Vicksburg Group boundary in Mississippi. The horizontal dashed line extending from 0 delta T at right indicates our present climate, one of four warm periods punctuating the present Ice Age.

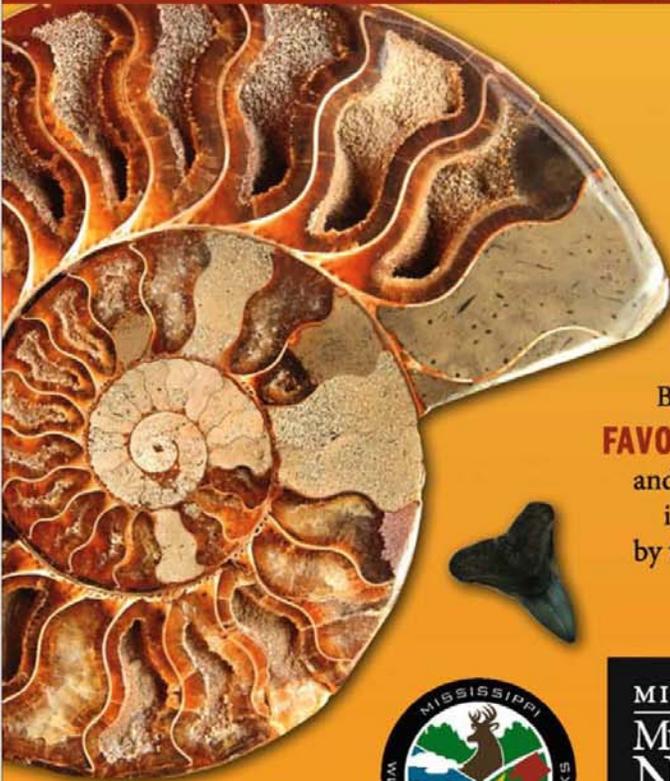
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- Draft permits currently at public notice, <http://opc.deq.state.ms.us/publicnotice.aspx>.
- Permits and certificates issued in the last 90 days, http://opc.deq.state.ms.us/report_permits.aspx.
- General permit coverages issued in the last 90 days, http://opc.deq.state.ms.us/report_gnp_issued.aspx.
- Notices of Intent for coverage under a Statewide General permit received by the Environmental Permits Division, http://opc.deq.state.ms.us/report_gnp_notice.aspx.
- List of the 401 Water Quality Certifications currently at public notice, http://opc.deq.state.ms.us/report_wqc_public_notice.aspx.
- List of the compliance inspections recently conducted, http://opc.deq.state.ms.us/report_eced_tasks.aspx.
- Orders issued by the Mississippi Commission on Environmental Quality, http://opc.deq.state.ms.us/report_orders.aspx.

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Washington County.

Taken by Steve Bailey,
Environmental Compli-
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Division.

