LOUISIANA CIVIL ENGINEER

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FEATURE:

Coastal Protection and Restoration of the Chenier Plain

NEWS:

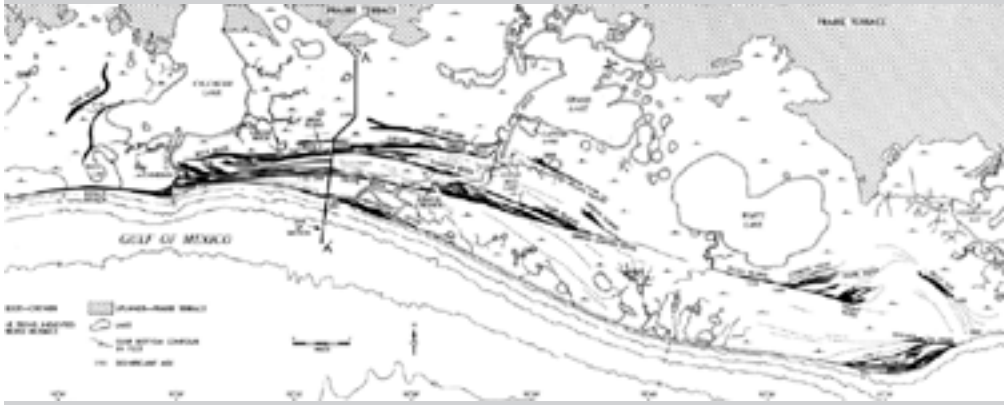
A New Day in the Atchafalaya Basin

Pass Chaland to Grand Bayou Pass Barrier Shoreline Restoration

ANNOUNCEMENTS:

2009 Louisiana Section Awards and Officers Installation Luncheon

Cheniers and Historical Hydrology



Gould and McFarlan 1959

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The Louisiana Section is located in ASCE Region 5 that consists of the Louisiana, Mississippi, Alabama, Georgia and Florida Sections.

President's Message

By Ali M. Mustapha, PE

Ali M. Mustapha, PE

It's hard to believe that I am writing my last President's Message. In less than two months, I will hand over the gavel to the 2009-2010 Section President, Christopher Knotts, P.E. It has been a fun and a very rewarding experience for me. Serving on the Section Board for more than eight years (at various times as Shreveport Branch President, Director at Large, and Section Officer) with a group of professional Civil Engineers who are dedicated and committed to serving ASCE and its members, as well as promoting and protecting the engineering profession has been a special honor and a privilege. Special thanks to all the board members for their support and guidance this year.

In late 2008, the Section established the ASCE Louisiana Chapter of the Transportation and Development Institute (T & DI) to serve all of the Section members. Om Dixit, P.E., chaired the committee and played a significant role in forming the third T & DI Chapter in the nation. The only other chapters are in Colorado and Florida. The Chapter hosted its first seminar on July 16th at LSU Campus. T&DI has planned more seminars and workshops to benefit ASCE members and non-members in the state who are involved in the planning, transportation and development fields. Mr. Dixit is to be commended for his efforts in forming this chapter.

The Section Officers worked hard this year to insure we provided our members the utmost service. In Late 2008, we signed a Six-month contract agreement with Ms. Nedra Davis to provide editor services for the Louisiana Civil Engineering Journal. The Section Board is very pleased with her services and in March of this year had extended her contract until August 2010. On behalf of the Section Board and our members, I want to thank Ms. Davis for all her hard work toward insuring that the Section continues to publish an award-winning Journal. Also, thanks to Chris Knotts, President Elect, and the Chairman of the Publications Committee for assisting Nedra and for soliciting new business card ads for the Journal. Patrick Landry, P.E., the Section Vice President, was instrumental in updating and enhancing the Section's website and is to be commended for his hard work and dedication. The 2009 Section Spring Conference in Baton Rouge was very successful and well-attended. It provided our members the opportunity to acquire twelve Continuing Professional Development Hours. Kudos to Bob Jacobsen, P.E., Conference Chairman, Baton Rouge Branch Officers and all of the other volunteers for hosting a first class conference.

The 2009-2010 Section Officers will be installed at noon on September 18th at Juban's Restaurant in Baton Rouge. The Section's President and Board will need your help, support and guidance to lead our organization. Please consider volunteering to serve in some capacity at the Branch or Section level. By volunteering you can help make a difference. The Civil Engineering Profession and ASCE need your help and participation in order to continue to serve our members and promote and protect our profession.

As Professional Civil Engineers, we have dedicated our professional and technical knowledge to the advancement and betterment of mankind, and we have pledged to participate in none but honest enterprise and to serve the public above all other considerations. To help guide us in evaluating the ethics of planned actions or decisions, the National Institute for Engineering Ethics at Texas Tech University has developed the following nine tests:

- **Harms Test –** Do the benefits outweigh the harms, short-term and long-term?
- **Reversibility Test** – Would I think this was a good choice if I traded places?
- **Colleague Test** – What would my professional colleagues say?
- **Legality Test** – Would my choice violate a law or a policy of my employer?
- **Publicity Test** - How would my choice look on the front page of tomorrow's newspaper?
- **Common Practice Test** - What if everyone behaved this way?
- **Wise Relative Test** - What would my aunt or uncle do? and/or Would I want them to know what I am doing?
- **The Hiding Test** - Do I want others to know what I'm doing?
- **The Self-Respect Test** - How will I feel about myself after making this choice?

All of these tests promote decisions based on how we would "feel" about what we do, or if someone would know, or if we would be caught. However, the best decision is to ***"Do the right thing… because it's the right thing to do"*** rather than out of fear of consequences.

On a final note, I want to express my deepest and sincerest thanks to the Section Members for giving me the opportunity to serve as the 2008- 2009 Section President. I am also grateful to my family for their support.

Russo Named Chief, Ecosystems Evaluation and Engineering Division, ERDC-EL

Edmond Russo, Jr., has been named chief of the Ecosystems Evaluation and Engineering Division in the Environmental Laboratory (EL) at the U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Miss. In this position Russo, a 17-year veteran of the Corps of Engineers, will manage the division in workforce development to support high priority research, development, testing and evaluation missions for EL.

Prior to accepting his new position, Russo served as chief of the Coastal Engineering Branch in the Coastal and Hydraulics Laboratory (CHL), overseeing coastal engineering research and project investigations concerning risk-based coastal planning and evaluation that involved the uncertainties of climate change effects. He also served as the supervisor for the Brazilian exchange officers during their rotation at ERDC as part of the Military Personnel Exchange Program between the U.S. and Brazil, and was recently awarded a certificate of appreciation from the Brazilian Military Attaché for the part he played in the program.

Russo, a New Orleans native, graduated from Louisiana State University in 1990 with a bachelor's in civil engineering. He also earned a master's in civil engineering from the University of New Orleans in 1997 and graduated in 1999 from the Army Management Staff College, Washington D.C., in sustaining base leadership and management.

2009 LOUISIANA SECTION AWARDS AND OFFICERS INSTALLATION LUNCHEON

September 18, 2009
Juban's Restaurant
3739 Perkins Rd - Baton Rouge, LA

Announcement:

The Baton Rouge Branch is pleased to host the Section Awards and Officers Installation Luncheon that features the installation of the officers of the Louisiana Section and the Baton Rouge Branch boards of directors and the recognition of some of the Section's most outstanding members as its annual award recipients. This meeting is held in conjunction with a lunch that celebrates the end of the Section's administrative year and the beginning of the next year. All Section members and their guests are invited to attend and celebrate.

This year's event will be held at Juban's Restaurant in Baton Rouge. This year's meeting will a Luncheon and will be held at 11:30 a.m on Friday, September 18th.

Reservations:

Reservations are required and must be made through Clint Wilson by email at secretary.ascebr@gmail.com. All reservations must be made by September 16, 2009.

Coastal Protection and Restoration of the Chenier Plain

By Ehab Meselhe, PhD, PE, Director, Center for LA Water Studies Institute of Coastal Ecology and Engineering, University of Louisiana at Lafayette

Ehab Meselhe, PhD, PE

This article is aimed to briefly review the history of Louisiana's Chenier Plain, discuss the current ongoing effort to study this vase ecosystem, and provide an overview of the "Southwest Coastal Louisiana Feasibility Study." The objective of the first phase of this feasibility study is to examine proposed large-scale protection and restoration strategies. The feasibility study is a joint effort between the State of Louisiana, the US Army Corp of Engineers, and the University of Louisiana. A regional scale hydrodynamic and salinity transport model was developed to better understand the circulation patterns and salinity regimes of the region. The model domain includes the near-shore Gulf of Mexico, Sabine, Calcasieu, Grand, and White Lakes, marshes, as well as the interconnected network of channels, canals, and hydraulic structures. Overall, the model includes over 870 miles of channels and bayous including the Gulf Intracoastal Waterway, Sabine-Neches Ship Channel, Calcasieu Ship Channel and other natural and engineered canals. The model also includes various CWPPRA project structures and real-time operations on lock-structures operated by the US Corps of Engineers. The model was verified against daily and monthly averaged water levels and salinity throughout the region as well as hourly velocity field samples at the Calcasieu, Sabine, and Mermentau tidal passes. The statistical analysis and visual observation of the model performance indicate that the model provide reasonable information about daily variation of water level and monthly-averaged salinity within the system. The model will be key analysis tool to evaluate the various protection and restoration strategies.

Background and History:

The Louisiana's Chenier Plain extends from Vermilion Bay southwest of Cypremort Point, Louisiana to Sabine Lake in southeast Texas (Figure 1). It encompasses Region Four of the Louisiana Coastal Zone covering Cameron, Calcasieu, and Vermilion Parishes. The Chenier Plain is a shore-parallel zone of alternating ridges separated by mud flats. The term "chenier" is derived from the Cajun term "chene" for live oak, the tree species that colonized the crests of the higher ridges. The Chenier Plain is rare; one of only three worldwide. The Plain's mud flats and marsh areas were originally formed by silt deposited by the Mississippi River during the era where it could shift course. As time passed wave action, along with other factors, formed the beaches and unique ridges that resemble the whiskers of a cat (Figure 2). From geological point of view, the Chenier ridges are fairly young where the oldest are less than 3,000 years and the youngest are 1,100 years old (Woosley, 2009).

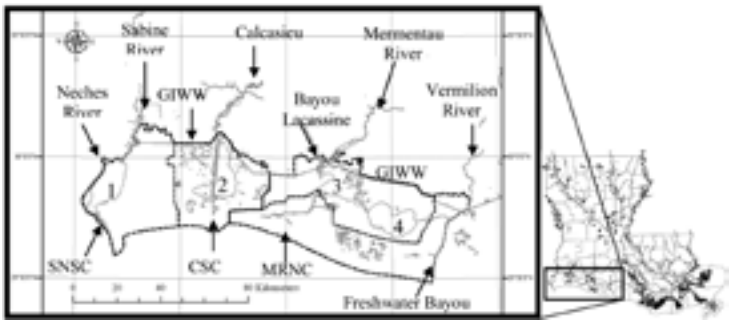

Figure 1: Louisiana Chenier Plain and hydrologic sub-basins (SNSC: Sabine-Neches Ship Channel; CSC: Calcasieu Ship Channel; MRNC: Mermentau River Navigation Channel). Lake System: 1: Sabine Lake; 2: Calcasieu Lake; 3: Grand Lake; 4: White Lake.

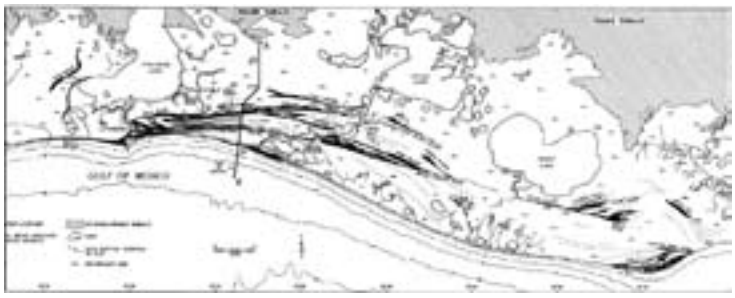

Figure 2: Cheniers and Historical Hydrology (after Gould and McFarlan 1959)

The Chenier Plain is connected to the Gulf of Mexico through specific local rivers and bayous. Historically, sand bars typically plugged the mouths of these local bayous and rivers and protected the interior from saline water. Storms, however, would unplug through the sand bars to drain the freshwater runoff. In a short time frame, sand bars would build up again and protect the interior from the Gulf's saltwater. This entire cycle of depositing the River's silt, forming the ridges, along with the cyclic process of sand bars plugging mouths of the local bayous and rivers (in between storms) happened only during the last 8,000 years (Woosley, 2009).

Altering the Hydrology

Figure 3: Altering the Hydrology of the Chenier Plain: Timeline of major projects

Over the years, human activities such as dredging ship channels and access canals, building roads and hydrologic barriers, as well as constructing hydraulic structures have altered the hydrology of the Chenier Plain. A brief summary of major projects in the Chenier Plain area is shown in Figure 3.

The Calcasieu and Sabine-Neches Ship Channels, two historically shallow waterways (4m deep), were deepened and widened considerably to support the deep-draft shipping needs of the upstream petrochemical, textiles and crude petroleum industries serviced by the Ports of Lake Charles, Beaumont and Orange (USDA-SCS, 1993).

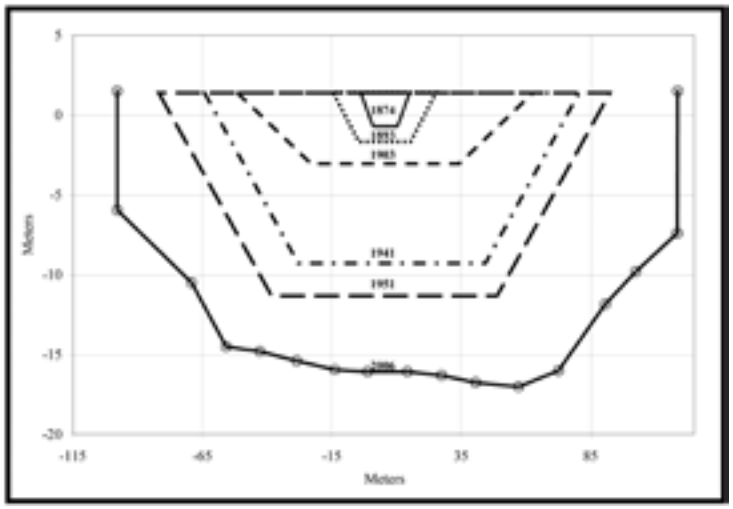

Figure 4: Increases in the Calcasieu Ship Channel dimensions over time (Adapted from Gammill et al. 2002 and altered by Miller and Meselhe 2007)

The deepening of these major ship channels (Figure 4) to support economically-efficient marine operations and the daily lock operations on the man-made Gulf Intracoastal Waterway (GIWW), Mermentau River, Freshwater Bayou, and Schooner Bayou have dramatically affected the current Chenier Plain salinity and tidal characteristics. Combined with the dredging of many smaller access channels for the exploitation of oil and gas resources, the Chenier Plain, a historically north-to-south flowing freshwater to brackish estuary, has been converted into a more saline ecosystem criss-crossed by access canals with flows traveling laterally through the GIWW (Gammill et al. 2002).

Southwest Coastal Louisiana Feasibility Study

The Southwest Coastal Louisiana Feasibility Study, a joint effort between the US Army Corp of Engineers and the Office of Coastal Protection and Restoration (OCPR) has recently started. The University of Louisiana at Lafayette is playing an integral role of the hydrologic investigation component of the study. The objective of the study is to identify coastal protection and restoration measures that are feasible. Ultimately, the study would recommend a regional plan that can be implemented.

The first step of the feasibility study is to solicit protection and restoration alternatives or strategies from the various state and federal agencies, academia, non profit organizations, as well as the general public. To the best of the author's knowledge, some 250 strategies were compiled to date. The proposed alternatives include (but not limited to) approaches such as marsh management, terracing, freshwater introduction structures, salinity control structures, shoreline protection, freshwater retention and regulation, property buyout, etc. Careful and thorough screening process of these alternatives is currently underway. Ultimately, the objective of the screening and analysis process is to arrive at a comprehensive plan to protect and preserve the Chenier Plain at the regional scale. It is likely that this comprehensive plan will be a composite of both natural and engineered components.

Protection and Restoration Goals:

The Chenier Plain is so fragile due to the fact that the very processes that formed it cease to exist. The Mississippi River can no longer shift course and deposit new silt; the mouth of many of the local rivers and bayous is so massive in size (and maintained as such for navigation, fishing, and oil exploration purposes) such that sand bars cannot, and are not allowed to plug it between storms to protect the interior from saltwater. The jetties at the mouth of the main navigation channels also prevent the long-shore sediment material from depositing and nourishing the beaches of the Chenier Plain region.

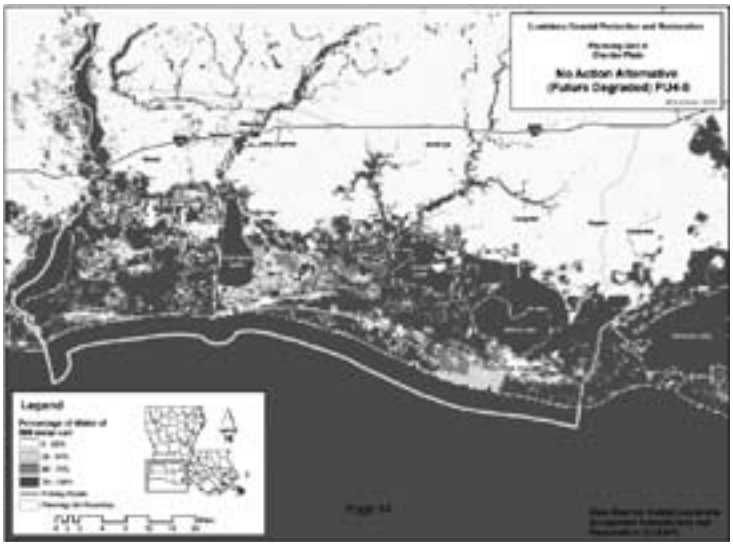

Figure 5: Projection of the future of the Chenier Plain if no action is taken.

If no action is taken to protect and restore the Chenier Plain, land loss through conversion of marsh to open water would continue (Figure 5). Although I cannot talk on behalf of all agencies, it is reasonable to assume that all involved agencies, the stake holders, as well as most of the local community of scientists and engineers wish to preserve and protect the Chenier Plain. In other words, the question is not whether to preserve and protect the Chenier Plain. Rather, the extremely challenging question is HOW? Additional questions include: At which state do we desire to sustain the Chenier Plain? Is the current state acceptable? If we wish to restore it to a previous reference; what is that reference? If we all can agree on specific ecological goals (which is no easy task), e.g. Figure 6, can we accommodate these ecological goals while meeting the demands of the shipping, fishing, hunting, and oil and gas interests?

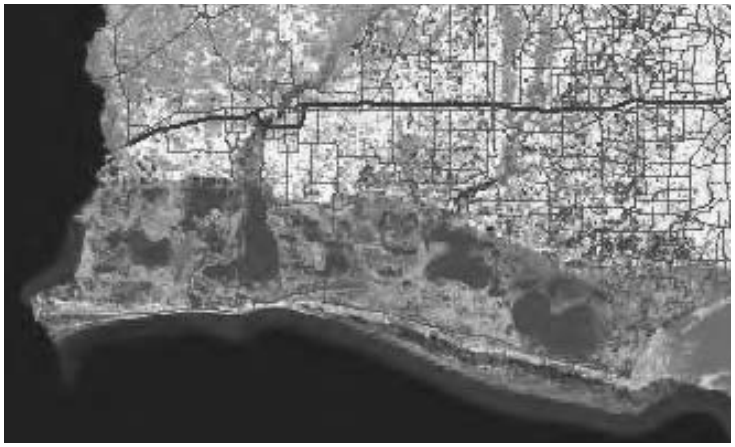

Figure 6: Hypothetical Wetland Habitat Goals

In my opinion, based on years of experience gathering field data and performing hydrologic analyses, it is not possible to restore the Chenier Plain to a much healthier ecological state while maintaining the full set of activities. A reasonable compromise must be exercised and accepted by all stake holders. However, I am compelled to emphasize that excessive delay in reaching such a compromise is not in the best interest of any.

It is beyond this article to design the framework of such a compromise. However, I can offer the following three key and fundamental components of such a compromise:

- It should be balanced among the multiple uses of the Chenier Plain.
- It should be financially feasible such that it can be implemented within the expected level of funding
- It should promote a final comprehensive restoration strategy that offers benefits to ALL stake holders beyond the no-action option.

The key to success is to ensure that the comprehensive protection and restoration plan offers a beneficial setting beyond the no-action alternative. Therefore, there will be an incentive for involved parties to participate in and support the implementation of such a comprehensive protection and restoration plan.

Modeling Effort:

A hydrodynamic and salinity transport model was developed for the Chenier Plain to better understand the circulation patterns and salinity regimes. The model encompasses the large lakes and water bodies, the interconnected channels, the vast marsh areas, as well as the major hydraulic structures. The model has specifically been developed to improve our understanding of the dynamics of this coastal system at the regional scale, and to provide a quantitative assessment and evaluation of proposed protection and restoration strategies. This model is an effective screening tool vital to the Feasibility study currently underway.

This section provides a brief overview of how the model was setup and verified against field observation to establish an acceptable level of credibility.

A. Available Data:

Bathymetry and Marsh Elevation:

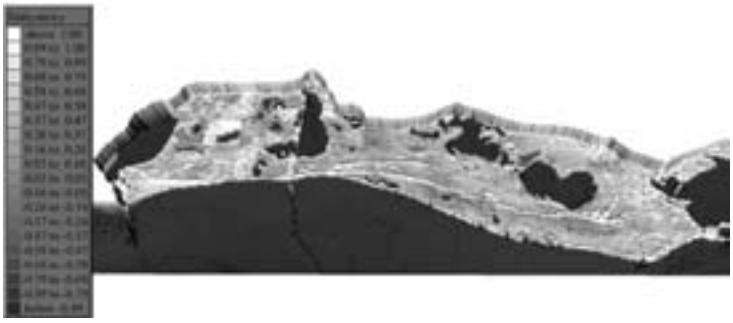

Figure 7: Regional Model grid (elevations in meters, NAVD88)

The relief grid (Figure 7) relies on data from two primary sources: the Louisiana Statewide LIDAR (Light Detection and Ranging) Project (Cunningham, Gisclair, and Craig, 2004) and the National Geophysical Data Center's (NGDC) Coastal Relief Gridded database. *Bare-earth LiDAR was used to represent the land topography and was combined with the Coastal Relief Gridded Database furnished Gulf sounding data to create the model's bathymetry. Gulf of Mexico near shore bathymetry was obtained directly from the NGDC's GEODAS database from depth soundings taken relative to the Mean Lower Low Water datum in 90m spacing. Bathymetry is a crucial component in hydrodynamic modeling as the depth of each cell affects the observed tidal signal and velocities (Wood and Fleming, 1981).* It is noteworthy that all elevation-derived data including cross-sections, bathymetry, water surface elevations, and tide data were ultimately converted to the NAVD 88 datum.

Hydrologic Data:

The Chenier Plain receives fresh water from six rivers, namely the Vermilion, Mermentau, Lacassine, Calcasieu, Sabine, and Neches. Daily average discharges are furnished by the United States Geological Survey for Neches River at Evadale TX, Sabine River at Ruliff TX, Calcasieu River at Kinder LA, Bayou Lacassine near Lake Arthur LA, Mermentau River near Mermentau LA, and Vermilion River at Perry LA.

Water levels used by the model both as boundary conditions and for validation were published relative to Mean Sea Level (MSL), Mean Low Gulf (MLG), and Mean Lower Low Water. Each of these reference surfaces are based on the mean tides at a particular location. As such, it would not be expected that one should obtain a uniform datum conversion from one location to another. Tronvig et al. (2004) observe that relationships between tidal and geodetic (fixed) relationships are not well known in coastal Louisiana and identify this as an uncertainty that plagues local hydraulic studies.

Datum conversions were obtained for tidally-referenced data by comparisons with nearby NAVD 88-referenced water level gauges. After the conversion was made, a data cleansing step involved removing erroneous values (by visual inspection and comparisons with nearby stations) and filtering the water level boundary data with a 3-hour centered moving average to limit the random noise typically present in field measurements. These data-cleansing

steps and smoothing techniques were employed only on model input data to ensure stability at the model boundaries, particularly for the Gulf of Mexico open water boundary. Note that no smoothing was performed on the data used to validate the model. Preprocessing of validation measurements was limited to datum conversions and careful removal of unquestionable outliers from the datasets (Miller and Meselhe, 2007).

Salinity and Meteorological Data:

The sources of salinity data used presently are the USGS, Louisiana Department of Natural Resources (LDNR), and the U.S. Army Corps' of Engineers (USACE). Overall, the network of salinity measurements in the interior of the Chenier Plain was adequate to validate the model. However, there is a lack of measurements in the Gulf to create a representative profile of the Gulf salinity.

Wind forcing, Evapotranspiration (ET), and rainfall are included as important forcing functions in this Regional Model. Wind data was taken as time-varying but constant in space. The continuous wind stress in the model was based on data from the National Data Buoy Center's (NDBC) SRST2 station near the Sabine Bank in the Gulf of Mexico and from data at the Lake Charles Airport (NOAA). Daily ET and rainfall were both included in the model as spatially-varying from a network of National Climatic Data Center (NCDC) rain gauges that had been implemented. The data source for rainfall and ET was the Louisiana State University Agricultural Center (LSU Ag-Center) in Crowley and the only quality control measures required was removal of outliers and filling gaps with nearby gauge data.

Open Water Salinity and Tide Conditions:

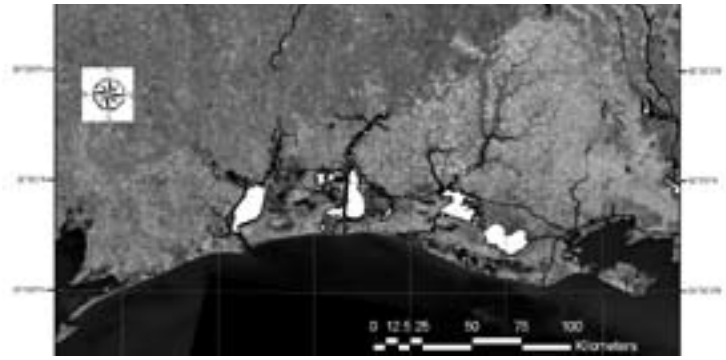

Figure 8: Monitoring stations used for boundary conditions (squares), calibration/validation (circles), and velocity validation (triangles). Diamond stations represent sources for wind speed (1a), rainfall (2a), and ET (2a)

The active real-time station CSI-03 south of Marsh Island LA (Station 18, Figure 8), managed by the Coastal Studies Institute of LSU, was supplemented by active stations at or near the tidal passes to approximate the Gulf open boundary conditions. Water level data at the tidal passes was obtained from NOAA's Galveston station at Pleasure Pier (Station 1, Figure 8), NOAA Sabine Pass North (Station 2, Figure 8), USGS 080170118 Calcasieu River at Cameron (Station 3, Figure 8). The eastern boundary condition in Vermilion Bay was provided by data from the USGS station at Cypremort Point (Station 17, Figure 8). Both tides and salinity exhibit temporal and spatial variability across the Gulf of Mexico boundary, with salinity showing a stronger variability in response to the Atchafalaya and Mississippi River littoral drift.

B. Setup of the Regional Model

The modeled domain is bound to the west by the Sabine-Neches Waterway, and extends nearly 125 miles east to Vermilion Bay. This area encompasses Cameron Parish, western Vermilion Parish, and extreme southern Calcasieu Parish. The north-south boundaries include the GIWW on the north and the Gulf of Mexico at the horizontal 29.5 degree latitude line. In addition, the east-west flowing Gulf Intracoastal Waterway, Old Intracoastal Waterway (Schooner Bayou) and the man-made Freshwater Bayou form linkages between the regional hydrologic basins, are also represented in the model.

The model also includes the major connections to the Gulf of Mexico such as Sabine Pass, Calcasieu Pass, Mermentau River Navigation Channel, and the connections provided by the Freshwater Bayou-Vermilion River System. Smaller connections in the Rockefeller Refuge such as Joseph's Harbor, Humble Canal, and Rollover Bayou contribute to the salinity regime and are also included in the current analyses. In summary, the model consists of 800 miles of channels, 23 explicit structures (weirs, flap gates, overflow gates, and earthen plugs), 2,775 channel cross-sections, and nearly 90,000 marsh and open water computational points.

Channel Network

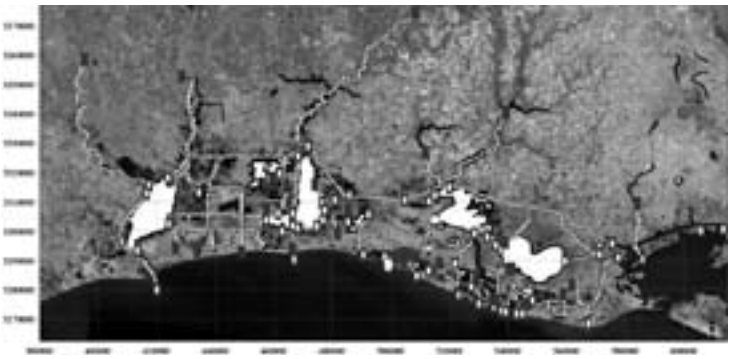

Figure 9: Chenier Plain MIKE 11 channel network (scale in meters). Dashed lines represent 2D model open boundaries

The Chenier Plain channel network (Figure 9) is a looped system of channels and tributaries affected by tides, precipitation, wind, local hydraulic structures, and freshwater runoff from inflowing rivers. The modeling approach adopted in the regional model ignores the presence of salinity stratification; a phenomenon admittedly present in the larger tidal passes at the Gulf of Mexico. However, in the numerous shallow water bodies and marsh areas throughout the Chenier Plain this is an appropriate simplifying assumption, particularly when analyzing depth-averaged salinities and surface water levels. Previous modeling efforts address the occurrence of stratification in the large Sabine and Calcasieu Ship Channels of the Chenier Plain (Meselhe et al. 2004, and Meselhe 2004). Strictly speaking, a more accurate formulation would be to use a three-dimensional model of each channel to account for these dense salt wedges existing beneath the less-saline waters at the top. However, for this regional scale modeling effort, the main focus is to under-

stand the overall dynamics of the system and how it responds to regional restoration strategies rather than the specific flow-field details. Such details will be appropriately studied with a high-resolution local modeling effort.

Existing Hydraulic Structures

Figure 10: Freshwater Bayou Lock averages 16,000 lockages per year (USACE, 2005)

A large number of structures intended to improve the Chenier Plain hydrology have been implemented through various initiatives. Currently the Regional Model includes 23 explicit structures consisting of 12 weirs, 6 culverts with flap-gates, and 5 dynamic control structures. As-built structure geometric details in conjunction with survey data were used to incorporate these structures. Five large dynamic water control structures constructed by the Corps' of Engineers (e.g. Figure 10) exert a significant influence on the hydrology and drainage potentials in the east and east-central Chenier Plain (Gammill et al. 2002). Operations for these five structures are available in number of total hours opened and closed per day. There is no corresponding record of the time of day a particular operation occurred. Factors controlling these operations include salinity, basin management practices, hydraulic head differential, commercial barges, and recreational boat traffic. As a result, to expect a deterministic control schedule for the structures is not realistic. This uncertainty in scheduling made it necessary to extrapolate information about the operations. Additional structures are being added at the present time in an effort to further refine the model.

Model Validation:

In order to ensure that the numerical model mimics the water and salinity circulation patterns in the Chenier Plain, it was compared to field observations. Initially, some model parameters were fine tuned until a satisfactory agreement between the model predictions and the field observations were obtained. This process is called model calibration. Afterward, the model was validated by producing predictions, for a different time period, and was compared against a second (fully independent) dataset of field observations. Sample of the comparison between the model prediction and field observations are presented in Figures 11, 12, and 13. As shown in the figures, calendar years 2003 (calibration) and 2002 (validation) were chosen because of the overall data quality and availability. The year 2002 was a wet year (184.4 cm) and 2003 (135.9 cm) was normal compared to the average yearly precipitation of 139.7 cm. Two notable tropical storms affected the region during this period; Hurricane Lili (10/2002 – validation) and Tropical Storm Claudette (7/2003 – calibration).

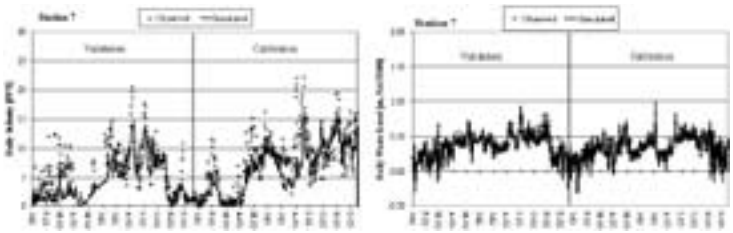

Figure 11: Calibration and validation results for water level and salinity at station 7

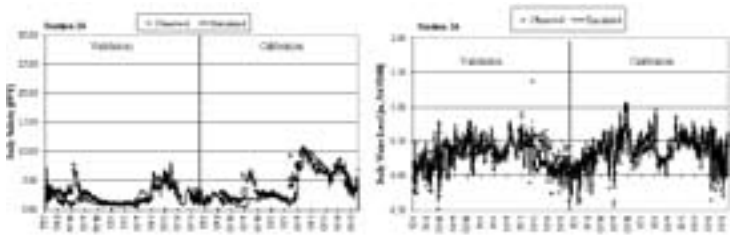

Figure 12: Calibration and validation results for water level and salinity at station 16

The results suggest that the model was able to explain the variability in daily water levels and salinity reasonably well (Figures 11 and 12). The model also compared quite well when validated against instantaneous velocity field measurements (Figure 13). Deviations in stage are likely caused by uncertainties in the bathymetry and roughness factors, and salinity deviations can be attributed primarily to uncertainties in the overall hydrodynamics, USACE structure operations, and boundary conditions in the open Gulf.

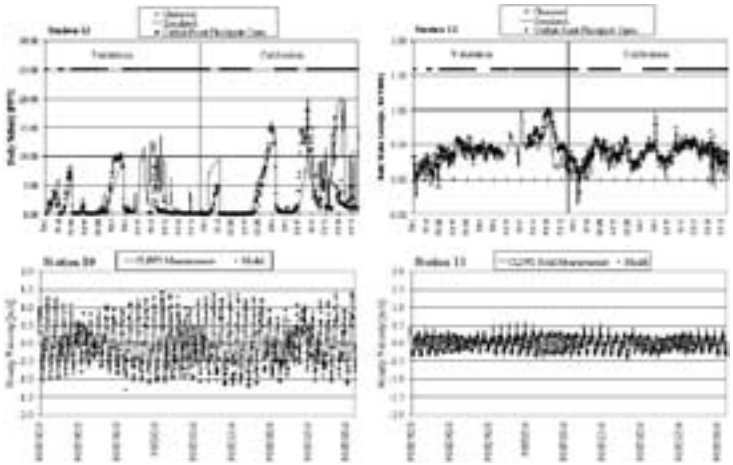

Figure 13: Model results for salinity and water level at station 12 (top); validation results for velocity Stations 10 and 11 (bottom)

Overall the simulated hydrodynamics was quite reasonable. Furthermore, the model performed reasonably well at capturing persistent salinity patterns on both the daily and monthly time scales. This ability to capture salinity average values over a long-term scale is ecologically beneficial when studying the impact of saltwater intrusion on important wetland plant species (Hester et al., 2002).

Assessment of Model Performance

A qualitative assessment of the hydrodynamic model performance shows that the model agrees well with the observations.

Performance measures are developed here to give a quantitative assessment of the model. These include the root-mean square error (RMSE), bias, and coefficient of efficiency. The RMSE and efficiency measures and their interpretation can be found in Legates and McCabe (1999). Bias is defined by Montgomery et al. (2001). In each definition below, N represents the sample size:

Root-mean-squared-error (RMSE): [9]

$$RMSE = \sqrt{\frac{\sum (simulated - observed)^2}{N}}$$

RMS % [10]:

$$RMS\% = \frac{RMSE}{Observed\ Range}$$

Bias [11]:

$$Bias = \frac{\sum (simulated - observed)}{N}$$

Coefficient of Efficiency (E) [12]:

$$E = 1 - \frac{\sum (simulated - observed)^2}{\sum (observed\ average - observed)^2}$$

Bias shows the models' tendency to predict systematically higher or lower than the observations on average. Smaller absolute bias and RMSE (also called RMS Deviation) values generally indicate a better fit of the observations (Legates and McCabe, 1999). The coefficient of efficiency (*E*) measures how well the model compares to the mean observed value. The best possible efficiency is 1.0, indicating perfect agreement between the model and the observations. An efficiency of less than zero suggests that the observed mean is a more efficient predictor than the model. Table 2 presents the calibration and validation results for the three stations qualitatively presented in Figures 11 and 12.

Table 1: Quantitative assessment of model performance during calibration and validation (parenthesis)

Variable	Stage				Salinity			
Station	RMSE cm	RMS %	Bias cm	E	RMSE ppt	RMS %	Bias ppt	E
USGS B. Fearman (Station 16)	10.4 (12.2)	8% (4%)	6.1 (-3.0)	0.86 (0.82)	1.8 (1.5)	20% (21%)	-0.80 (-0.27)	0.55 (0.29)
ME11-01R (Station 12)	8.8 (15.2)	9% (11%)	-4.0 (-4.0)	0.91 (0.82)	5.31 (2.93)	29% (28%)	1.62 (0.79)	-0.19 (0.00)
CS09-02R (Station 7)	6.1 (6.7)	7% (7%)	-1.2 (-1.8)	0.95 (0.95)	3.15 (3.25)	14% (17%)	-1.22 (-1.22)	0.57 (0.32)

General Discussion

It was observed that the model was sensitive to Gulf forcing conditions, and operations of the Corps' of Engineers major hydraulic structures, as well as smaller local structures. The opening and closing of the structures creates a timed release of discharge depending on the direction of the hydraulic gradient. This discharge periodically impacts salinities and downstream flow conditions (Figure 13, top left). Thus it is important to model these structures correctly. Model reliability will be enhanced as more detailed operations records become available.

Overall, the model performed well on a daily time scale and can be used to predict the regional response of the Chenier Plain to a number of restoration alternatives. The results suggest that the model is ideally suited to analyze the regional changes to salinity and water levels on either a daily, or more appropriately, a monthly time scale given the grid resolution, model extent, and current level of uncertainty in the boundaries and structures within the region. The Regional Model could be further improved as more detailed information about operations on the major structures, additional surveys on the major lakes, and as additional hydrologic field data especially salinity and stage measurements in the near shore Gulf of Mexico become available (Miller and Meselhe, 2007).

Closing Remarks on the Modeling Effort

The main objective of this modeling effort is to gain a quantitative understanding of the water and salinity circulation patterns in the Chenier Plain. The model will be used to screen and assess the performance of proposed wetlands rehabilitation and restoration alternatives. These alternatives can be compared both quantitatively and visually (e.g. by producing monthly average maps as shown in Figure 14). In addition, the model will be used to assist in calculating an overall water and salinity budget for the system by providing estimates for Gulf inflows at areas where measurements are not feasible. In addition to the modeling efforts, a monitoring plan is underway to supplement the existing network of gauges, support future improvements to the modeling effort, and improve upon the water and sediment budget analyses. It is noteworthy to state that the model is one of the most effective ways to identify bathymetric and hydrologic data gaps, and thus, can be used to guide the design of future monitoring plans.

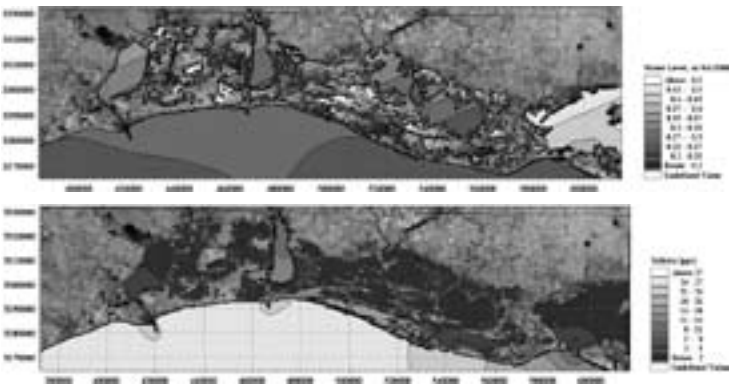

Figure 14: Simulated monthly averaged salinity (bottom) and water level map (top) for April 2003

Overall, the comparisons between the model results and the field observations suggest that the hydrodynamic model is suitable for examining the regional system response to hydrologic changes and is ready to test various scenarios with confidence. Examples of such restoration scenarios may include freshwater diversions, modifications in structure management and operations, construction/removal of roadways and embankments, construction of salinity and water control structures, channel modifications, salinity regime shifts, and various water management alternatives.

Future Directions:

In this article a numerical model at the regional scale was presented. This model, along with a suite of other engineering and scientific tools, can be used to screen protection and restoration strategies. Nonetheless, the numerical model, or any other engineering design and analysis tool, is not the rescuer for the Chenier Plain. It is merely a tool that can assist us in screening options, design components, and analyzing performance. The challenge remains to revolve around defining and agreeing on the protection and restoration goals. Clearly, the Chenier Plain is a working coast with multiple, sometimes conflicting, uses. Realistically, it is not possible to design a protection and restoration strategy that will completely fulfill the needs of all functions. Therefore, a *compromise* is the only possible, feasible, and achievable solution. Now the question is how and who can define and design this compromise? I find it trivial to simply suggest "open communication" and "transparency" as the conduit to reach this challenging compromise. These words are so broad and have been said before and not much progress has been accomplished. It will take a serious "resolve" to reach that compromise. At a minimum, the proposed comprehensive restoration strategy for the Chenier Plain should offer benefits to all stake holders involved well beyond the no-action option. In my opinion, this is a key to reaching an agreement on the path forward.

An excellent example of how a mega size project can be studied, designed, and built in an incredibly efficient timeframe is the Bonnet Carre Spillway. A wealth of experience and familiarity with projects of that magnitude resides at the US Army Corps of Engineers and the state Office of Coastal Protection and Restoration. Such knowledge should guide the entire process and rally all stake holders involved toward reaching the desired compromise. Experts in Academia can and will continue to play a critical role guiding the science and engineering effort.

In closing, the Chenier Plain is special and is worth saving. However, I believe if each stake holder insists on solutions that serve only their needs, the aforementioned compromise will not be reached, and aimless studies and efforts will continue to circulate. If the status quo continues, we will eventually lose the Chenier Plain under the stress of saltwater intrusion coupled with severe hurricanes and tropical storms. The Southwest Louisiana Feasibility Study brings hope to reach a meaningful protection and restoration plan to preserve the integrity and health of the Chenier Plain.

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A New Day in the Atchafalaya Basin

By Stephen Chustz, Acting Director, Atchafalaya Basin Program
Louisiana Department of Natural Resources

Stephen Chustz

Louisiana's Atchafalaya Basin area has always been a signature natural feature of the state, with ties to Louisiana's history, its culture and its economy. It is considered by many to be the crown jewel of Louisiana's sportsman's paradise. The Basin is home to a number of threatened and endangered species and provides vast recreational opportunities to our citizens and visitors in addition to having a significant economic impact on the State's economy from its natural resources. However, actions that have been taken in the Basin for flood control, navigation and consumptive use of its natural resources have had an adverse impact on the ecological health of the basin. The ongoing effort of keeping the Atchafalaya River and the Basin it nourishes a healthy, viable part of the state is a cooperative effort between state and federal government along with many other stakeholders in the basin. The State of Louisiana has recently embarked on a new process to accelerate the restoration and preservation of this valuable natural resource.

The heart of the Basin system is the Atchafalaya River, a 170-mile long river that is the largest distributary stream of the Mississippi River, stretching from the Old River Control Structure near Simmesport to the Gulf of Mexico south of Morgan City. That Atchafalaya River feeds roughly 838,000 acres of forests, bayous, swamps and lakes – including the largest contiguous bottomland hardwood forest remaining in the United States.

Some 60 species of reptiles and amphibians, along with over 250 species of birds, including the American Bald Eagle, Ivory-billed Woodpecker and the Peregrine Flacon can be found in this productive region. Many types of animal life and nearly 100 different species of fish and aquatic life depend upon this habitat. In addition to activities such as boating, camping, eco-tourism and recreational fishing, the basin is a productive commercial crawfishing area.

The Basin ecosystem and recreational and economic activities are all tied in are all dependent on the continuing effort to manage the water quality of the area. Efforts to manage the hydrology of the Basin are not new as some projects date back more than 100 years. While drawing on the lessons of past actions in the Basin, the Louisiana Department of Natural Resources' Atchafalaya Basin Program has embarked on developing a new approach to solving an old problem in the Basin - poor water quality. The new annual planning process ensures that water quality and water management projects are given priority and that approved projects are based on sound science.

One of the first major projects impacting the Basin was the mid-1800s clearing of "the raft," a 30-plus mile obstruction of logs and other debris which had accumulated in the river system and slowed the Atchafalaya River to no more than a sluggish bayou. A series of projects cleared the raft and led to increased water flow in the Basin, but also brought more severe flooding in the area. The Great Flood of 1927 covered the entire basin area, and the communities there, with water from the Mississippi River. In reaction to that and other flooding along the Mississippi River, the federal government acted with the intent of protecting lives and property and maintaining shipping along the Atchafalaya River by making the Atchafalaya Basin a spillway to provide an outlet for the Mississippi River in times of flood. In 1928, the federal government began building extensive levees and other structures to help with navigation and flood control.

In 1963, the U.S. Army Corp of Engineers completed the Old River Control Structure which would regulate water flow from the Mississippi and Red Rivers into the Atchafalaya River. The actions taken to protect life and property, provide navigation and produce the natural resources of the basin soon began to show an impact. Increases in the amount of sediment flowing into the Basin after construction of the floodway, began converting swampy areas into dry land. As the water slowed and sediment was deposited, some areas were cut off from water flow creating hypoxic conditions. Other areas were artificially impounded. The resulting effects were negative impacts to the ecology of the Atchafalaya Basin.

In response to these impacts the citizens of the State of Louisiana along with State and Federal Officials worked with Congress to begin the restoration and preservation of the Atchafalaya Basin. The 1982 Water Resource Development Act (WRDA 1982) bill began the formal establishment of a federal program to address the ecology of the basin. In 1985, the federal government authorized the Atchafalaya Basin Floodway System – Louisiana Project and a Federal Master Plan was subsequently developed. In 1996, the Department of Natural Resources was named lead agency for developing a plan to protect, restore and enhance the Basin area. State legislators created the Atchafalaya Basin Program and an advisory board in 1998, and approved a state Master Plan for the Basin in

1999. Much of the state's effort from 1999 to 2005 was centered on the recreational components of the State Master Plan striving to offer all citizens the opportunity to participate in the "Atchafalaya Experience". However, impacts to the hydrology and habitat of the basin remained a concern.

Sedimentation and poor water quality continue to be major concerns for management of the Basin. It is with those concerns in mind that state Department of Natural Resources Secretary Scott Angelle worked with state legislators in 2008 to create a new approach for protecting and preserving the Basin – an approach strongly rooted in applying the best science to manage the resource. Water resource management and enhanced water access came to the forefront as priorities in 2005, and that was codified through the legislative actions of 2008

The new process calls for a formal annual planning process, mixing public input and transparency in planning and execution with scientific oversight and design.

The process begins each year with public meetings to solicit ideas for projects from residents, property owners and other interested parties. After that, a statutorily created Technical Advisory Group (TAG) reviews proposals to determine whether those projects meet established criteria and are based on sound science. This includes comparison of the projects to the basic criteria established of projects of being within the Atchafalaya Basin Floodway System, having the potential to directly address water quality and/or sedimentation problems in the floodway, addressing conservation, protection and/or restoration of the basin ecosystem, and enhancing the natural resources of the Basin, including fisheries, wildlife and/or forest resources.

The TAG is made up of scientists from the departments of Natural Resources, Wildlife and Fisheries, Environmental Quality, Agriculture and Forestry, as well as the U.S. Fish and Wildlife Service, U.S. Geologic Survey, U.S. Army Corps of Engineers and Louisiana State University School of Renewable Resources. The group's task is to ensure that proposed projects are grounded in the best available science, and as such, TAG is one of the critical components in the new process. It is extremely important that projects with a foundation of sound science and engineering principles are submitted to the TAG for consideration by Basin stakeholders. The TAG will evaluate projects that are submitted and certify that projects selected will result in significant water management and/or water quality improvements that will enhance the wildlife, fisheries, or forest resources of the Atchafalaya Basin.

Once the TAG members have met and selected a final list of suggested projects for each year that information is compiled into a draft Annual Basin Plan for the Atchafalaya Basin Research and Promotion Board, which holds public hearings on the proposed Annual Basin Plan. The plan must also be approved by the Louisiana Coastal Protection and Restoration Authority for consistency with Louisiana's Comprehensive Master Plan for a Sustainable Coast before being sent on to the state Legislature for approval. Since the Atchafalaya River is the only place in coastal Louisiana where land is building naturally, the river is a key component of the State's Master Plan for a Sustainable Coast. In addition, scientists evaluating the Basin are looking for opportunities to take the sediment flowing into the Basin from the river, which causes negative impacts, and use it and the freshwater of the Atchafalaya River to help build land and aid the effort to restore Louisiana's coast. It is imperative that the preservation and restoration of the Atchafalaya Basin and coastal restoration efforts must be closely intertwined.

The new Atchafalaya Basin Annual Plan process is the key to the future of the Atchafalaya Basin's ecology and economy. The focus on science based decisions for water management will ensure that projects selected for implementation will be beneficial to the ecological health of the Basin. Successful project implementation will lead to improved habitat, improved water quality and a more vibrant ecological community. Collaboration of stakeholders in the Basin along with State and Federal agencies will ensure that limited resources and restoration efforts are coordinated and focused to maximize results and provide a healthy ecosystem in the Atchafalaya Basin for generations to come.

Stephen Chustz earned a Bachelor of Science in Geology from the University of Louisiana-Lafayette. He has more than 22 years of state service. Chustz began his State career with the Louisiana Department of Environmental Quality in 1987. His work at LDEQ included work in surface water enforcement, source water protection and ground water remediation issues. Chustz became the Deputy Assistant Secretary of the Office of Coastal Management in December 2008. He also assumed the job of Acting Director of the Atchafalaya Basin Program in January 2009 where his work has included the development of the first Annual Basin Plan that was required by Act 606 of the 2008 Regular Session of the Louisiana Legislature.

Editorial - Social Networking for Dummies

By Deborah Ducote Keller, PE

If you have been in the engineering profession at least thirty years, you've witnessed the transformation from slide rules to the chunky Texas-Instrument calculators that replaced them, as well as the room-sized main frame computers being replaced with the personal desktop/laptops that we now find so essential. More recently, we've experienced the leap of a mobile phone from merely a portable telephone to a handheld device capable of tapping into the internet with applications we never imagined. All this happened not over a period of centuries, but just thirty years. And the technology is not just in the hands of scientists and engineers anymore, but every socio-economic group on the planet from young children to senior citizens.

While we are very much aware of the how technology has evolved and impacted our practice of engineering, perhaps for many readers, the social impact has not been so readily apparent. Distracted by all the hardware and software, the people side of technology may have passed you by.

Have you been wondering about some new words in the media such as Facebook, MySpace, and Twitter? When the internet was first introduced to the public, it was called the information superhighway. It was a route to research the world wide web of data that connected super computers at universities and government agencies. Each web site was a stopping place on this superhighway of information where one could stop, browse around, exchange information, and communicate. Soon businesses and organizations, like ASCE, started web sites, and we've all been surfing the net every since.

But some young genius types at Harvard took it to a new level in 2004. What if an ordinary person could connect not only to impersonal internet sites, but connect with real people via the internet? What if people could find like minds and share thoughts based on mutual interests or common values or similar agendas? That would be a network. That would be similar to all these people on the information superhighway stopping not a place of information, but at a party, or a meeting, or a forum to interact socially. This virtual social network would allow people to mentally be in the same place whether they were physically in the same building or thousands of miles apart. Instead of sharing information about things, they could share their lives on this network and thus socialize.

That's what Facebook and MySpace, the two most popular social networks are about. At no cost to the users, a simple registration is all that is needed to have your very own website on a social network. The owner of each site decides what is public information and what is private, and therefore limited to selected "friends." The owner decides what photos to display on the site, what feelings to express, what messages to send to friends, etc.

Anything social will involve etiquette, and that's new territory with regards to manners. For example, if you search the internet and find someone you know who has a site on a social network, you have to send a request to be their friend in order to view the private side of their site. If you don't get a reply, then it's a sign that the person prefers not to give you access. Don't be offended if this happens. There are people who will gladly have lunch with you on a work day, but don't feel that they have the type of relationship with you to invite you to their house for dinner. It's pretty much the same thing.

Be aware that unlike a phone conversation, every friend who has access to your site will see nearly everything you post on your site, and sometimes what your friends are posting on their sites. Also, don't become a target for identity theft by revealing too much personal data on these sites.

In 2006 Twitter came along. Twitter is also free social networking. It allows users to send and receive text messages that are called "tweets." Think of a tweet as an email to your phone that you subscribed to receive from a person or business. Because I already get about a 100 work related emails a day, and another 50 emails on my personal email, I don't care to get blasted with more messages from friends, relatives, elected officials, nor celebrities telling me their thoughts or updating me on their status, i.e. what they are doing at the moment. Twitter may be fascinating for many people, (Oh, the governor just sent ME (and 50,000 others) an email on my phone!) but it's not for me.

You can check this out at www.facebook.com or www.twitter.com . Following the lead of the recent election frenzy of 2008, many elected officials now use both of these means to communicate with their constituents and each other. Organizations are finding it a faster, easier, no cost way to communicate effectively with members instead of a traditional website. Businesses, likewise, are experimenting with the concept of a more personal and dynamic means to interact with a target audience.

Just be aware that there are social rules, legalities, and liabilities with these technologies which you can easily find by searching the web. And when you do, please don't email me, Facebook me, or send me a tweet!

Pass Chaland To Grand Bayou Pass Barrier Shoreline Restoration

By Michael Poff, PE and J. Steven Dartez

Michael Poff, PE

Introduction

The Pass Chaland to Grand Bayou Pass Barrier Shoreline Project is located along the Bay Joe Wise Headland between the confluence of Bayou Huertes with the Gulf shoreline and Grand Bayou Pass in Plaquemines Parish, Barataria Basin, Louisiana (Figure 1). Wetland, beach, dune and marsh habitats within the Project area have undergone substantial loss due to oil and gas activities, subsidence, sea level rise, and storm erosion. Development of fragmentary islands caused by breaches in the barrier islands and subsequent inlet formations have resulted from increased tidal prism storage and storm related impacts within the region.

Coastal Engineering Consultants (CEC) of Naples Florida and SJB Group (SJB) of Baton Rouge Louisiana led the integrated consulting team through the design, permitting and construction of the Project (BA-35, Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) Priority Project List 11). The federal and state sponsors are the NOAA Fisheries and Louisiana Office of Coastal Protection and Restoration (OCPR), respectively. The Project is funded and authorized pursuant to CWPPRA (16 U.S.C.A., Sections 3951-3956). The OCPR is administering the construction contract and the CEC-SJB Team provided resident inspection and construction management services. Great Lakes Dredge and Dock Company, LLC (GLDD) of Oak Brook, Illinois is the general contractor. Manson Gulf, LLC of Houma, Louisiana served as GLDD's lead subcontractor. The Construction Cost is approximately $35 million.

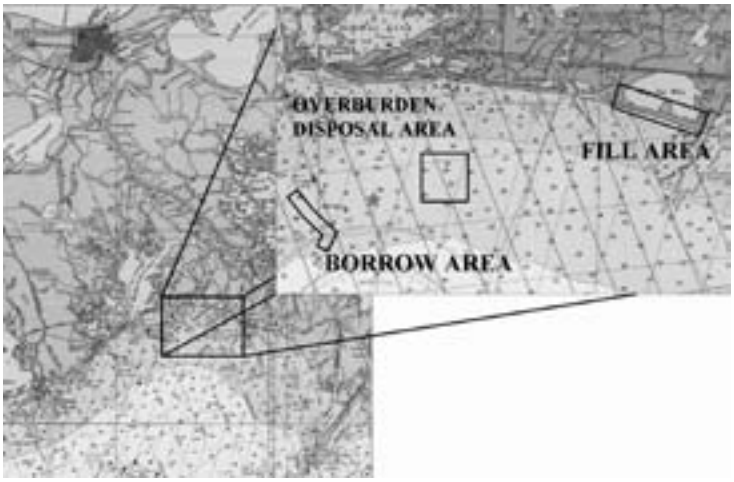

Figure 1. Location Map

The Project goal is to protect and preserve the structural integrity of the barrier island, dune and wetland habitats. The Project features included creation of a 1000 foot wide marsh platform using 1 million cubic yards of mixed sediment contained with primary and secondary containment dikes. The seaward beach-dune platform was expanded and the breaches filled to address the severity of erosion using 2 million cubic yards of sand placed along the 2.7 mile long gulf shoreline. Also included were a water exchange channel, access channel and signage, sand fencing, and vegetative plantings (Figure 2). The Project benefit includes over 420 created acres, which will maintain and mature to approximately 160 acres of barrier island and wetland habitats at year 20 of the design life.

Figure 2. Project Features

Design Challenges

Bay Circulation and Flushing

Extensive modeling consisting of cross-shore sediment transport, circulation and water levels, and inlet stability was conducted to evaluate design alternatives in terms of performance, constructability and environmental impacts and enhancements. The circulation model, ADCIRC (U.S. Army Corps of Engineers Surface Water Modeling System) was performed to quantify potential impacts in Bay Joe Wise from the proposed marsh creation area, address the concern that construction would alter circulation resulting in changes in sedimentation patterns, and confirm that sufficient water levels and flow would be maintained within the bay system to support the newly created marsh. The primary tidal forcing functions were input along the model's gulf boundary. Water levels and flow velocities were simulated throughout the model grid. Field data from measured current and tide data were used to calibrate the model.

To evaluate alternatives, bathymetric grids were modified for each marsh fill template, and circulation modeling for each design was conducted. Results were evaluated to ensure the design did not greatly reduce flow, increase (causing potential scour) or decrease (causing potential deposition) water velocities significantly, or cause significant changes to water elevations through the bay system. The modeling results indicated that significant changes to the

flow through the bay system were not anticipated provided the primary flow-way leading from the bay's west side to Pass Chaland was maintained. Thus a water exchange channel through eight acres of existing healthy marsh was designed and permitted to provide this essential flow-way.

Sand Source Search and Borrow Area
After extensive regional surveys, the borrow area was identified offshore in a relic distributary channel seaward of the Quatre Bayou Pass ebb shoal complex. This sediment source contained a top layer of non-compatible finely graded clay overburden. This was underlain by a crossbedded mixed sediment layer comprised of fine sand, silts and clays ideal for the marsh platform. At depth, a bottom layer of fine sand was tested and met criteria for the beach-dune fill. Access to the sand was crucial for the success of the Project. Because the combined volume of the overburden and marsh fill cut greatly exceeded the fill template, an offshore disposal area was identified, designed and permitted. In close proximity to the borrow area, it served to accommodate the significant volume of overburden and avoid having to pump, handle, and dewater this poor quality material at the shoreline.

Oyster Leases, Pipelines, and Landowners
Similar to most coastal Louisiana restoration projects, the beach, dune and marsh restoration footprint must invariably address existing oyster leases. The Project design was completed in early 2005. However, due to the development of the Louisiana Oyster Lease Acquisition and Compensation Program, and Hurricane Katrina damage, the final bid package was delayed.

Two major pipelines run shore parallel through and two major pipelines run from offshore across the existing headland. Special construction measures had to be included in the plans and specifications to protect this infrastructure since the access and water exchange channel crossed these pipelines. An unwilling landowner on the eastern end of the restoration area also impacted the marsh footprint. Thus the marsh fill template was redesigned and buffers added to avoid this property yet provide the reinforcement of the shoreline to prevent breaching during the design life.

Hurricane Impacts

In 2005 Hurricane Katrina struck the Louisiana coastline and changed Louisiana forever. The storm, which produced major coastal damage, passed directly over the barrier island directly impacting the Project. An existing small breach enlarged significantly becoming the primary tidal exchange between the gulf and bay. This change in inlet hydrodynamics resulted in Grand Bayou Pass, the Project's primary construction access route, filling with material at the eastern end. This resulted in Pass Chaland becoming the sole construction access into the back bay, which due to existing pipelines, significantly increased the difficulty and related costs to construct the marsh dike containment system. Further, the enlarged breach transported hundreds of thousands of cubic yards of sand from the beach and dune into the bay. Combined with gulf front beach profile losses as the entire barrier system eroded landward, a complete redesign of the beach, dune, and marsh fill templates was required. In 2008, Hurricanes Gustav and Ike both impacted the headland and again the Project had to be redesigned. In total, material losses due to these hurricanes were measured at over 1 million cubic yards since the original design plan was completed in early 2005.

Construction Details

The State of Louisiana issued Notice to Proceed on June 6, 2008. The contractors began mobilizing on June 10, 2008 with the installation of the sediment delivery pipeline followed by the arrival of GLDD's cutterhead dredge *Alaska* to the borrow area on June 29, 2008. Access channel dredging using Manson Gulf's barge mounted bucket dredge *Terrebonne Bay* commenced on July 3, 2008. Construction proceeded through August 3, 2008 when Tropical Storm Fay caused the contractors to demobilize the dredges. Construction resumed on August 8, 2008 and continued until August 27, 2008 when construction equipment again demobilized in preparation for Hurricane Gustav. Hurricane Gustav followed by Hurricane Ike ravaged the Louisiana coast through the first two weeks of September 2008. Construction was shut down for approximately 30 days and the contractors remobilized and reinitiated work on September 30, 2008. Stripping and sidecasting overburden material into the offshore disposal area, access and water exchange channel dredging, and containment dike construction were the primary work components completed through the end of December. On December 23, the *Alaska* began pumping beach, dune and marsh sediments to the Project area. Figures 3 and 4 depict the *Alaska* and *Terrebonne Bay*, respectively.

Figure 3. Cutter Head Dredge Alaska

Figure 4. Bucket Dredge Terrebonne Bay

Based upon the daily reports and surveys provided by the contractor, the preliminary volume estimates are as follows. Approximately 2.1 million cubic yards of overburden were striped off the top of the borrow area and placed in the offshore disposal area. Approximately 890,000 cubic yards of marsh fill were placed within the design marsh fill template. Approximately 2.1 million cubic yards of beach and dune fill were placed within the design beach-dune fill template. Over 5.4 million cubic yards of marsh, beach, and dune fill were excavated from the borrow area marsh and beach fill cuts.

Figures 5 and 6 are ground photographs of fill placement within the marsh and beach/dune fill templates, respectively. Figure 7 is a typical cross section depicting the original pre-construction survey, second pre-construction survey (post-Ike), and post-construction survey superimposed on the design template.

Figure 5. Dredged Fill Being Discharged Into Marsh Containment Cell

Figure 6. Dredged Fill Being Discharged Onto Beach and Dune

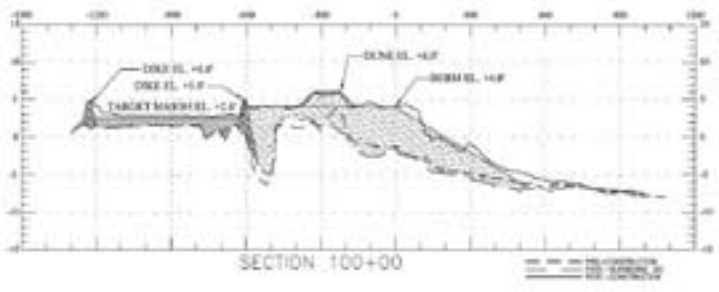

Figure 7. Typical Cross Section Depicting Construction Templates

Dredge and fill activities were completed on May 17, 2009. Sand fencing was installed between May 26 and June 11, 2009. Full demobilization was completed the first week of July 2009. Vegetative plantings for the dune and north containment dike are scheduled for the summer of 2009. Marsh vegetative plantings are scheduled for year three to allow sufficient time for the marsh to consolidate and reach the tidal zone. If necessary, small breaches in the primary marsh containment dike will be made to initiate circulation into the new marsh fill area. Figure 8 presents the finished product on the beach and dune. Figure 9 captures the ecosystem restoration goal of the Project to provide new habitat for shore birds.

Figure 8. Completed Beach and Dune Fill

Figure 9. Roseate Spoonbills Back on the Island

Construction Challenges

Challenges that occurred during construction included addressing the significant background erosion and episodic losses attributed to the hurricanes that led to the redesign of the restoration templates as described above. To accomplish this goal, the OCPR, CEC, and GLDD worked together to determine a solution. The borrow area design was revisited to isolate sections of the marsh cut layer comprised of the mixed sediments that contained sufficient percentages of sand for use in beach fill construction, for use in closing the breach and providing the needed quantity of sand to complete the beach and dune fill template. Another obstacle the contractors encountered was attempting to construct the containment dikes around the marsh platform perimeter within and adjacent to the breach. By constructing the beach fill template in a "low" fill to seal the breach, the contractors were able to eliminate the tidal exchange between the bay and the gulf such that they could complete the dikes. One benefit to sealing the breach was to force strong tidal flow through Pass Chaland, thus keeping the channel scoured and "open" for the deep draft construction vessels accessing the project area and significantly reducing the contractor's maintenance dredging of the access channel.

Acknowledgements

The authors thank the staff of NOAA Fisheries and OCPR for their support, patience, hard work, and perseverance through the design, and permitting, and construction stages of the Project (Figures 10 through 12). We also thank Great Lakes Dredge and Dock Company, LLC and Manson Gulf, LLC for their cooperation, housing and accommodations, and quality work.

Figure 10. December 2008 Aerial Photograph, view is east to west
(photo courtesy of Great Lakes Dredge and Dock)

Figure 11. March 2009, Aerial Photograph, view is west to east
(photo courtesy of Great Lakes Dredge and Dock)

Figure12. May 2009, Aerial Photograph, view is east to west
(photo courtesy of Great Lakes Dredge and Dock)

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J. Steven Dartez is a Field Engineer for Coastal Engineering Consultants, Inc. in their branch office in Baton Rouge, Louisiana. He received his B.S. in Electrical Engineering in 1991 from Louisiana State University and currently holds a 100 ton Master (Captain) license from the U.S. Coast Guard. He has over 17 years experience working in coastal environments and brings this experience to the feasibility and design of coastal engineering projects. His engineering responsibilities include participation in coastal restoration planning, design, and construction administration. He has experience in island restoration fill template design, borrow area delineation, dredge and fill quantities calculations, and cost estimating. His surveying experience includes coordination, planning, and conducting bathymetric surveys, hydrologic monitoring, water quality and level monitoring, and meteorological data collection.

BATON ROUGE

By William H. Wall, PE, Branch President

The May luncheon featured Baton Rouge Mayor-President Melvin "Kip" Holden as our speaker. 100 people attended the luncheon. The Mayor gave us an update on the city's sewer, road and loop projects. The May luncheon was our first fundraiser luncheon for each person that paid we collected an additional $10 to be given to Engineers Without Borders Baton Rouge Chapter. We collected $800 at the luncheon and the Branch added a $1000 to the donation making the total $1800. This is a program that we will continue in the future.

The June luncheon was our Recognition Luncheon where we honored our Past Presidents and the 2009 Branch Award winners. We also gave checks out to Engineers Without Borders (EWB) and Volunteers in Public Schools. The EWB check was for $1800 and Volunteers in Public Schools check was for $750 which was part of our SPAG(spell out) program The 2009 Branch Award winners were: Outstanding Young Government Civil Engineer Award, Dain Gillen; Outreach Award, Jeffrey L. Duplantis; Outstanding Civil Engineer Award, Charles L. Eustis; Outstanding Government Civil Engineer Award, Paul B. Fossier, Jr.; Outstanding Young Civil Engineer Award, Russell J. "Joey" Coco, Jr.; Educator of the Year Award, Roger K. Seals; the Lifetime Achievement Award, Charles W. Hair, Jr.; and the Wall of Fame Award went to Gordon P. Boutwell.

Also of note in June, we brought back the newsletter which has been missing in our branch since 2005. We encourage everyone to read the newsletter and give us input , because this newsletter is for our members.

The Baton Rouge Branch will not have a luncheon in July, as this will be our summer break. We hope that everyone has a great summer and will see you at the August Luncheon.

Baton Rouge Branch Past Presidents

2009 Baton Rouge Branch Award Winners

Engineers without Borders

Volunteers In Public Schools

SHREVEPORT BRANCH

By Daniel Thompson, EI

The Shreveport Branch had a great 2008-2009 year! This past year's events included our annual can food drive in November and our golf tournament in May, as well as, monthly meetings from September to April. We also were able to attend the Louisiana Tech Student Chapter Winter Banquet where we gave two scholarships to the outstanding senior and junior civil engineering students. Callie Hernandez was selected as the outstanding senior civil engineering student and Stephanie Bayne as the outstanding junior. These students were selected by the civil engineering faculty of Louisiana Tech. Congratulations to these recipients on a job well done!

Our 2009 Spring Classic Golf Tournament was a large success thanks to our sponsors and loyal companies in the area who always participate. Thank you for your continued support in our endeavors.

The 2009-2010 year will be a busy one for our Branch. We will be hosting the annual Spring Conference this year in Shreveport. The date of this event will be April 8-9, 2010 at the Clarion Hotel. We are currently searching for vendors and sponsors for this event and are interested in hearing any comments or suggestions on ways to ensure a great conference. If you are interested in speaking or having an exhibit, please contact me at (318)-425-7452 or by e-mail at dthompson@afjmc.com. The Baton Rouge Branch hosted this past year's conference and had an extremely good turnout. The conference is always a great event for our members. To continue that tradition, the Shreveport Branch hopes to attract a large crowd with a great program.

I would like to thank our Past President Todd Henry, as well as, Patrick Furlong and Matt Redmon for their hard work throughout the year for our branch. We look forward to another great year in 2009-2010.

ASCE-SEI New Orleans Chapter Report

By Om Dixit, PE, FASCE, Newsletter Editor

Since our report in May issue of this magazine, ASCE SEI New Orleans Chapter hosted two seminars and has planned the following future seminars in New Orleans:

April 16, 2009 **More To Concrete Than Meets The Eyes**,
Dr. Kenneth Hover (Cornell University, Ithaca, NY) presented 2009 Annual David Hunter Lecture that was attended by about 70 members. Dr Hover explained all the phases of concrete structure in entertaining and simple ways. Dr Hover also mentioned that the construction period is typically less than 0.1% of the length of the expected service life of a concrete structure and short-term changes in the material and the construction environment have long-term consequences.

June 24, 2009 **Interpretation of Geotechnical Investigations for Implementation in to Project Design**
William W. Gwyn, PE (Eustis Engineering, Metairie, LA) presented another seminar on geotechnical investigation report implementation. Bill explained the different tests, observations and analysis results presented in typical geotechnical investigations reports for various types of projects. The assumptions and the limitations of the recommendations were also discussed for understanding and usage by a Structural Engineer. The Seminar was attended by about 55 members.

August 6, 2009 **Transforming The Project Delivery Process Using Building Information Modeling (BIM)**
James G Jacobi, Walter P. Moore and Assoc., Houston, TX

continued on next page

Mike Choudhry SEI Chairman in 2008 receives his gavel plaque from Jay Jani Chairman in 2009.

Dr. Kenneth C. Hover, PE receives his speaker appreciation plaque from Ralph Junius, Lecture sponsor with Jay Jani SEI Committee Chairman at right.

Future Seminars:

The following dates are the projected seminar dates for 2009. The exact dates may change due to the availability of the speakers and UNO Lecture room.

October 15, 2009	*Marine Seminar* (3rd Herb Roussel, Jr. Marine Seminar) John Kachaturian, VERSABAR
November 18, 2009	*Rebuilding/Recovery of Pentagon* Allyn Kilsheimer, KCE, Washington, DC
December 3, 2009	*Seminar on Timber Design* Dr. V. Gopu, LTRC/LSU, Baton Rouge, LA

More details about these seminars will be posted on the ASCE New Orleans Branch website as soon as they are finalized. The committee is looking for good topics and speakers for future presentations. Members with expertise in above areas would be welcome to join the Executive Committee. For any suggestion and joining the Executive Committee one can contact Chairman Jay Jani, Ph.D.,P.E., at jay.jani@engconsultsvcs.com.

ASCE SEI New Orleans Chapter welcomes ***Dr. Pawan Gupta*** (URS Corporation, Metairie, LA) as a new member on Executive Committee. His experience in Post-tensioning of structures will benefit the committee planning future activities.

All seminars are held at the University of New Orleans. Seminar dates, pertinent information, and registration can be found on the New Orleans Branch website at www.asceneworleans.org. To add your name to our mailing list, e-mail Om P. Dixit at om@fenster-maker.com.

ASCE-T&DI Louisiana Chapter Report

By Om Dixit, PE, FASCE, Chairman

The Chapter started its activities. First activity was a 2 hour seminar in Baton Rouge at LSU/LTRC facility on July 16, 2009. The seminar *"Design – Build Delivery, Penobscot Narrows & I 35 W St. Anthony Falls Bridges"* was presented by Ed Callicutt and Dwight Dempsey from FIGG. Both speakers presented the planning, design and construction aspects of each project. The event was attended by about 45 members.

ASCE T&DI Louisiana Chapter is planning the following future seminars:

October 14	*Common Pitfalls in NEPA Process* ***Noel Ardoin***
November 18	*I 10 Twin Span Construction* Speaker to be determined
January 21	*New Orleans Trans. Management Center* Speaker to be determined

If you want a seminar on any special topic, you should contact anyone on the Executive Committee and they will try to get it arranged.

More information could be found on the ASCE Louisiana Section website at www.lasce.org and ASCE New Orleans Branch web site www.asceneworleans.org. To add your name to our mailing list and/or to join the Executive committee, e-mail Om P. Dixit at om@fenstermaker.com.

Speakers Ed Callicutt and Dwight Dempsey with ASCE T&DI Seminar Coordinator, Gay Knipper (Center) for the first seminar at LTRC in Baton Rouge

LSU STUDENT CHAPTER

by Elise Trappey, Thomas Montz, and Brad Adams

Over this past spring semester, ASCE at LSU actively prepared for and participated in the concrete canoe and steel bridge competitions. Both teams would like to thank all of the sponsors for their support and generous contributions, including the LSU Department of Civil and Environmental Engineering and the Baton Rouge Branch of the ASCE.

This year's ASCE at LSU concrete canoe team met the challenge of creating a strong, lightweight concrete mix. The team hopes, pending the 2010 rule changes, to keep this mix as a base for next year's canoe. Using this base, the major goal for next year's canoe team will become building a more aesthetically pleasing canoe. This will include the use of a female mold as opposed to the male mold that was used this year. The team may also consider using inlaid designs and stained concrete. Next semester, the concrete canoe team will have the unique challenge of finding a new place on campus to build the canoe, since the old annex will be undergoing renovations for the foreseeable future.

After two semesters of designing, constructing, and practicing the 2009 steel bridge competitions have come to an end. ASCE at LSU's bridge team competed against 47 other schools from around the United States as well as Canada. The LSU Bridge Team placed 5th in display while receiving 40th overall. With only one returning member, this year's team may have lacked experience, but had the will, energy and competitive spirit to place in the competition. Regardless of results, the national competition was a great learning opportunity for the young aspiring engineers. Team captain Brad Adams said, "It was tough for us to compete with the more experienced teams, but we will take what we learned this year to improve and be a stronger competitor next year." Most of the team will be returning to compete again next year, eager to put the knowledge they gained to use.

ASCE at LSU will be holding meetings at 6:30 pm in the Germano Center next fall. The dates for the meetings include September 3rd, September 17th, October 8th, October 22nd, November 5th, and November 19th. At each meeting an engineering firm is invited to speak to the student chapter. One meeting during the fall semester will be reserved for our Annual ASCE at LSU career fair. We are looking forward to the upcoming semester!

ASCE at LSU's 2009 concrete canoe team at the Regional Competition in Joneboro, Arkansas

ASCE at LSU Steel Bridge Team at the 2009 National Competition in Las Vegas, Nevada

MOISSEIFF AWARD

The Moisseiff Award is given to the author or authors of an important paper published by the Society dealing with the broad field of structural design, including applied mechanics, as well as the theoretical analysis or construction improvement of engineering structures, such as bridges and frames, of any structural material.

Joel Conte, PhD, MASCE

Michele Barbato, PhD, MASCE

The 2009 **Moisseiff Award** is presented to **Alessandro Zona, PhD., Michele Barbato, PhD, MASCE**, and **Joel Conte, PhD, MASCE** for the paper, "Nonlinear Seismic Response Analysis of Steel-Concrete Composite Frames," Journal of Structural Engineering, June 2008. The paper provides excellent insight into the natural vibration properties and nonlinear seismic response behavior of Steel-Concrete-Composite frame structures and how they are influenced by various modeling assumptions. Among other important findings, it is demonstrated that a proper representation of the shear connection boundary conditions for all composite beams is crucial for accurate response simulation.

UNIVERSITY OF LOUISIANA AT LAFAYETTE ASCE MONUMENTAL MOMENT

By Stephanie Hesse, Secretary

Through grateful donations by Mr. David S. Huval, Sr., PE, and Mr. E. R. DesOrmeaux, PE, the American Institute of Structural Engineers Monument was constructed. This monument illustrates all of the major beams and connections in modern steel construction. Benches were also donated to place around the monument for all to use. The AISE Monument is located in front of Madison Hall near Rex Street.

The UL student chapter of the American Society of Civil Engineers held its Year-End Banquet on May 1st, where guest speaker, Mr. David S. Huval, Sr., PE, of Huval and Associates Inc., presented a captivating speech regarding the importance of mentors, and life experiences throughout his career. Professional Civil Engineers, Civil Engineering faculty, students, and family members were all present for the celebration of a great year.

The 2009-2010 ASCE officers are as follows: President-Callen Huval, Vice President-Alison Lognion, Secretary-Stephanie Hesse, Treasurer-Heath Michel, Parliamentarian-Garrett Noel, Events Coordinator-Corey Meaux, and Web Master-Shannon Gary. Working in conjunction with the officers as Faculty Advisor is Mrs. Jasmine Galjour.

Representatives from the UL ASCE chapter attended the ASCE Leadership Conference held in Cherry Hills, NJ. At the conference, the students were exposed to the challenging role of a professional civil engineer, and gained insight on how to improve the UL student chapter. To start off the new school year with a bang, the always-entertaining annual ASCE fall barbecue is set for September 1st at the Girard Park Pavilion. It is also with great pleasure to announce that music will be provided by The Huval Family Band. So grab a friend and don't forget your dancing shoes!

— Calendar of Events —

September 18, 2009	2009 ASCE Louisina Section and Baton Rouge Branch Awards and Officers Installation Luncheon, Baton Rouge, Louisiana
October 29-31, 2009	ASCE's 139th Annual Civil Engineering Conference Kansas City, Missouri
November 8-12th 2009	American Concrete Institute 2009 Fall Convention, Marriott, New Orleans, Louisiana

http://www.lasce.org/calendar.aspx

http://www.asce.org/conferences/

- Pipelines Conference 2009 [16-Aug-09]
- 14th Conference on Cold Regions Engineering [30-Aug-09]
- VI-International Conference on Environmental Hydrology & 1st Symposium on Coastal and Port Engineering [28-Sep-09]
- 5th Congress on Forensic Engineering [10-Nov-09]
- First International Conference on Coastal Zone Management of River Deltas and Low Land Coastlines [06-Mar-10]

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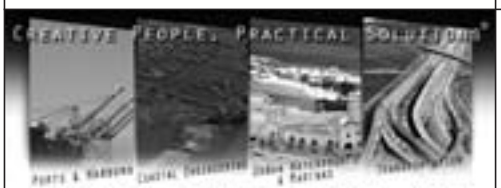

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