

Program Encourages 4-H Students to Prepare for a Resilient Future

"How old will you be in 50 years?" Mark Shirley asked a group of 4-H club members at Forked Island – E. Broussard Elementary School (FIEB) in rural Vermilion Parish recently. After a brief pause for calculations, hands shot up, and various sixth-, seventh- and eighth-graders replied, "64," "63," and "62."

"Where will the Gulf of Mexico be in 50 years?" Shirley then asked. Noses crinkled and heads tilted to the side, indicating the students were stumped, with most not realizing that their hometown is currently only 26 miles from the Gulf and 14 miles from Vermilion Bay. The scene was repeated at all the other 4-H clubs in schools in Erath, Maurice, Indian Bayou, Kaplan and Gueydan.

Shirley, a Marine Extension agent with Louisiana Sea Grant (LSG) and the LSU AgCenter, is asking more than 1,000 young people across Vermilion Parish to envision their retirement years and to consider the effects of coastal erosion and rising sea level on their future quality of life.

Working with Extension 4-H Youth Development Agents Shannan Waits and Hilton Waits, Shirley created and implemented "Coastal Resiliency: Preparing Vermilion Parish for the Future." The program includes a presentation and hands-on activities that meet state educational Grade-Level Expectations (GLE) for science. A GLE is a statement under the state's comprehensive curriculum plan that defines what all students should know and be able to do at the end of a given grade level.

While flooding and destruction from Hurricane Rita in 2005 and Hurricane Ike in 2008 made Vermilion Parish students well aware of their region's existing vulnerabilities, most did not know about the factors that potentially will exacerbate the problem and effectively draw coastal waters closer. FIEB and four other parish schools were inundated with 5-10 inches of water in both storms. Shirley showed maps of the state's coastal zone illustrating land loss from 1932 through 2010, and he explained the causes of coastal erosion: subsidence, saltwater intrusion, hydrology changes, storms and sea level rise. He also explained the expected impacts of relative sea level rise – the compounded effect of rising sea level and the sinking of coastal land from subsidence.

"Subsidence will probably sink the area about 7-9 inches in the next 50 years," Shirley said. Marsh loss of roughly 10,000 acres is

also possible in that time, and sea level rise is anticipated to reach approximately six to eight inches. So the Vermilion landscape could be more than a foot closer to sea level before these students are ready to retire.

Shirley also discussed ways to mitigate damage and introduced the concept of resiliency. He illustrated his point with a photomontage of two houses near a waterway, one built on a slab on the ground, the other raised several feet higher on piers. Gradually, as the water rises and the land surface decreases, the waterway in the illustration encroaches on the house on a slab. Add a storm surge from a hurricane event, and the slab house gets completely submerged.

After viewing Shirley's presentation, the 4-H members stepped outside to select a suitable spot to place a benchmark. Students helped dig a hole, mix concrete and set the aluminum marker in place. The following week, Maurice Wolcott, a GIS specialist, who holds a joint appointment with LSG and the LSU AgCenter, used GPS instruments to determine the elevation of the FIEB benchmark. FIEB came in at the second-lowest elevation of all schools surveyed – 5.8 feet above sea level.

Wolcott visited other sites in the program to accurately measure their benchmark elevations. Benchmarks were installed at 18 public and four private schools across the parish. Benchmarks were also established at the Vermilion Parish Courthouse, Magdalene Square, the public library and the LSU AgCenter Extension Office in Abbeville. Once all the data were collected and verified, the elevation was stamped into the metal. Certificates of elevation were presented to each 4-H club to be entered into the clubs' archives.

The idea for this project originated from a discussion that Shirley and Wolcott had several months prior to the school year. Wolcott had already done some computer modeling of storm surges in Vermilion and other coastal parishes. He made the point that while coastal communities may be miles away from the Gulf, they are vulnerable because of the low

elevation and flat terrain of coastal Louisiana. Shirley came up with the idea of putting the benchmarks at the schools to give students a reference point to consider.

"Maurice and I were talking about coastal changes one day and how distance to the Gulf can be thought of as both horizontal and vertical," Shirley said. "Vermilion's communities are 25 to 30 miles away from the Gulf of Mexico as the sea gull flies. But the communities are only feet away from the Gulf in terms of height above sea level."

Shirley's ultimate message for the 4-H'ers? Resiliency comes from being prepared, expecting changes, building homes better and higher, and by knowing the risks of a given area by checking flood zones. Even though they are years away from homeownership themselves, Shirley and the Waits hope their students will remember

the importance of planning for environmental changes.

"The students were able to grasp the fact that Vermilion is close to the Gulf and that the threat of storm surge is something they can expect as they grow older," Shirley said. "Many



Mark Shirley and students set an elevation benchmark in concrete.



of the students experienced the flooding first hand and shared that their houses were now lifted off the ground to prevent future flooding."

On the Web:

To find out the elevation of your home, go to the LSU AgCenter home page at <http://www.lsuagcenter.com>, and click on the "Flood Maps" link found under the "Features" section.

Sea Grant Personnel Solicit External Funding

By their very nature, Sea Grant extension and outreach professionals are self-starters. That entrepreneurial spirit not only means rolling up their sleeves and working in the trenches with stakeholders, but also identifying external funding to start new initiatives and keep existing projects moving forward.

During 2010 and 2011, Louisiana Sea Grant personnel were awarded more than \$2 million in external grants. The list includes:

- Seafood technology specialist Lucina Lampila, in collaboration with LSU's Marlene Janes, is part of the USDA-NIFA Food Virology Collaborate, which received \$25 million from the U.S. Department of Agriculture's National Institute of Food and Agriculture. Lampila and 30 collaborators from across the country will be studying human noroviruses throughout the food supply chain in an effort to design effective control measures and to reduce the number of virus-caused food-borne illnesses. Approximately \$300,000 of the \$25 million grant will come to LSU.

- Rex Caffey, director of Marine Extension, received \$641,000 from NOAA Fisheries for a project titled, "Socioeconomic Assessments for Northern Gulf of Mexico Fisheries." The project's goals include providing fisheries managers with current and longitudinal perspectives on the for-hire (charter boat) fishery in the Gulf, and examining and updating estimates of seafood demand in U.S. households for use in policy making.

- Thomas Hymel, Marine Extension agent for Iberia, St. Martin, Lafayette, Vermilion, St. Landry and Avoyelles parishes, is expanding the Delcambre Direct web-based marketing network across the coast. With a \$550,000 grant from the Oil Disaster Recovery Program, Delcambre Direct is evolving into the Louisiana Direct Development of Coastal Seafood Marketing Network. Over a

three-year period, the program will expand into Cameron, Lafourche/Terrebonne and the Southshore areas, providing fresh, quality shrimp to tens of thousands of consumers.

- Education coordinator Dianne Lindstedt received \$200,000 from NOAA Fisheries for a project titled, "Oral Histories in Communities at Risk." The objective is to capture the cultural and environmental histories of Louisiana's coastal communities before they are lost to subsidence, storms and sea level rise. As part of the project, high school students will help capture local oral histories and turn them into short videos.

- Fisheries specialist Julie Anderson was awarded \$163,992 from the National Fish and Wildlife Federation, as well as \$50,000 from the Louisiana Department of Wildlife and Fisheries, for a project to remove derelict crab traps from inshore waters.

- Molluscan shellfish specialist John Supan received \$424,015 from the NOAA/Sea Grant Aquaculture Initiative for "Farming the Fertile Crescent: Intensification of Oyster Culture in the Northern Gulf of Mexico." This three-year project focuses on oyster farming research in order to increase productivity, create jobs and provide a safe, sustainable domestic oyster supply.

- Jerome La Peyre, associate professor with the LSU AgCenter, is part of the Oyster Aquaculture Research Strategic Initiative in collaboration with Supan. Their project, "Evaluation of Oyster Stocks and Grow-out Methodologies for Commercial Production of Eastern Oysters in Gulf of Mexico Estuaries," is funded by the NOAA Aquaculture program for \$296,000. The project's objectives are to determine which of three culture systems produces the most desirable oysters and to eventually recommend which of the oyster brood stocks are best for hatchery production.



Lucina Lampila



Rex Caffey



Thomas Hymel



Diane Lindstedt



Julie Anderson



John Supan

Savolainen Honored with Schmied Award

Louisiana Sea Grant-sponsored graduate student Michelle Savolainen is the 2011 recipient of the Ron Schmied Memorial Scholarship Award. Savolainen was to accept the award at the 64th Annual Gulf and Caribbean Fisheries Institute Meeting in Puerto Morelos, Mexico, in November and present her research paper titled "The Recreational For-Hire Sector in the U.S. Gulf of Mexico: Structural and Economic Observations from the Third Decadal Survey." However, Hurricane Rina prevented her from accepting the award in person.

Charter boat captains from the Florida Keys to the southernmost tip of Texas were asked to complete the for-hire sector survey to gauge the impact of regulatory, economic and other factors on the structure

and resiliency of the charter fishing industry. The survey is conducted every 10 years. Texas A&M and the University of Florida administered the first two questionnaires. Louisiana Sea Grant conducted the third survey in 2010.

Ron Schmied worked for the National Marine Fisheries Service from 1978 until his passing in 1996. In 1982, he assumed the position of special assistant to the regional director for recreational fisheries in the Southeast Regional Office in St. Petersburg, Fla. There he helped establish agency policy and program guidance on recreational fisheries, acted as the agency spokesman on recreational fisheries issues, stimulated recreational

fisheries research agendas, and opened lines of communication with recreational fishery organization and industry leaders.

The endowed scholarship fund in Schmied's name supports graduate student travel to the annual meeting of the Gulf and Caribbean Fisheries Institute. The intent of the scholarship is to make it possible for the next generation of fishery professionals to experience the benefits that

come with participation in international meetings in the Gulf of Mexico and Caribbean region.



Michelle Savolainen

Research Update

Project Records Louisiana's Coastal Cemeteries

Louisiana's coastal cemeteries are a rich source of cultural history. Cemeteries can also provide valuable clues to the present and past identities of a community. Louisiana's coast is under a great threat from coastal erosion and storm surge. As people are forced to move inland, cemeteries are left abandoned and are often overlooked as part of the cultural landscape. In terms of erosion, when the land goes, the cemetery goes with it. Or, the combination of coastal subsidence and sea level rise causes permanent inundation.

A project funded by Louisiana Sea Grant seeks to record coastal cemetery data before they are lost to the forces of erosion and the Gulf of Mexico. Jessica Schexnayder, Louisiana Sea Grant, and Mary H. Manhein, LSU Department of Geography and Anthropology, are collecting GPS points and historical data for cemeteries within the state-designated coastal boundary. Maurice Wolcott, LSU AgCenter and Louisiana Sea Grant, is the GIS specialist on the project.

The main focus of the project is the geospatial documentation of cemeteries along Louisiana's coast. A number of groups have previously recorded GPS coordinates for the state's cemeteries, but most are single-point locations. The Louisiana Coastal Cemetery Project will record outer perimeter points for each cemetery surveyed. This method allows the total land area for each cemetery to be shown instead of a few random points.

Cemeteries that are closest to the coastline are the first data being collected. The closer to the coast a cemetery is, the more susceptible it is to erosion, storm damage and sea level rise. Storm surge from recent hurricanes has disrupted and displaced cemeteries along Louisiana's coast. Many of the coastal parishes

have cemeteries that have already gone underwater or are very near to being submersed.

The project team hopes to foster the idea that although the physical location of the cemeteries may not be able to be permanently saved, the historical location can be



saved through GPS documentation. Anyone with knowledge of an endangered coastal cemetery and who wishes to see it included in the project, can send contact and location information to Schexnayder at jsche15@lsu.edu.



Jessica Schexnayder collecting GPS coordinates at Picou Cemetery.

Turning Borrow Sites into Public Amenities

Louisiana's earthen levees are built with soil taken from sites called borrow pits or borrow sites. Pits vary in size and depth, and they're often left as they were when the last truckload of material was hauled away. A pair of LSU researchers would like to see these mined sites restored.

Bruce Sharky, professor of landscape architecture at LSU, and graduate assistant Peter Summerlin have devised guidelines to turn these literal holes in the ground into productive habitats to promote bio-diversity, outdoor recreation and education. More than 50 existing and potential borrow sites are located in parishes on both sides of the Mississippi River.

Working closely with Sharky, Summerlin has developed restoration plans for 11 sites in Jefferson, Orleans, Plaquemines and St. Bernard parishes.

"Peter has developed plans and designed how these sites could be refigured in terms of topography and vegetation to support fishing, wildlife and education," said Sharky. Restoration strategies include re-establishing native plants and developing other features so the sites can support native fish and bird species. Additionally, recreational fishing and birding facilities such as board walks, piers and information/education amenities are planned.

All 11 sites are near urban population centers. "The concept is to give people an alternative place for family outdoor recreation and school fieldtrips," added Sharky. The restored sites also could provide some level of flood protection and storm mitigation.

The concept was presented to the Louisiana Department of Wildlife and Fisheries in October. The planning report received a positive reception and is under consideration for possible future

applications throughout the state.

Sharky is hopeful that this initial research will serve as a model for identifying other borrow sites that have the potential to be transformed. The end goal is to create a design handbook for borrow pit habitat restoration to apply statewide.

Copies of the publication, "Giving Back," are available through www.lulu.com.



A borrow pit restoration plan with extensive habitat and educational resources.

2012-13 Omnibus Research Projects Announced

The Louisiana Sea Grant College Program is funding seven research projects for the omnibus period that begins Feb. 1, 2012. Below is a synopsis of the projects, along with a list of the principal investigators, Extension personnel and their affiliations.

Contribution of Maximum Freshwater Discharges from Caernarvon Diversion Project to Oyster Mortality Related to Freshwater Inflows in the Breton Sound Estuary, Louisiana

Jerome LaPeyre (LSU AgCenter)
James Geaghan (LSU)

Although a number of studies have been conducted on the effects of salinity and temperature on oysters, few studies have examined their combined effects, the effects of very low salinities, the effects of oyster size, or prolonged periods of low salinity.

Spat, seed and market-sized oysters will be produced at the Louisiana Sea Grant oyster hatchery, and their mortality and condition after exposure to salinity and temperature combinations in the range observed in Breton Sound during maximum freshwater discharges will be determined in controlled laboratory experiments and in the field. This project will be critical to better understand what controls salinities in Breton Sound and, more generally, the impact of fresh-water diversions, one of the key restoration/coastal management tools identified in the state coastal management plan, on oyster resources.

Development of Alternative Bait for the Commercial Blue Crab Fishery

Julie Anderson (Louisiana Sea Grant, LSU AgCenter)

The cost per pound of bait has significantly increased for Louisiana blue crab fishermen, as other costs, such as fuel and supplies, are also increasing. Atlantic menhaden is a bait of choice, but the current supply line shipping fish to Louisiana has several significant problems, and menhaden are in demand for other uses. Not only does the cost of the fish increase, so does the cost to ship them.

The objective of this study is to determine the feasibility of developing an artificial bait for the blue crab industry using waste byproducts from existing fisheries. Cost-effective bait will reduce expenses for blue crab fishermen and reduce fishing pressure on Atlantic menhaden, as well as add value to currently worthless byproducts.

Enhancing Seed Versatility and Protection against Biological and Coastal Environmental Variables to Improve Success Rates of Smooth Cordgrass Aerial Seeding

Herry Utomo (LSU AgCenter)
Steve Linscombe (LSU AgCenter)

Vegetation is vital to minimizing coastal land loss in Louisiana, and smooth cordgrass is an important species in this effort. It is usually hand-transplanted, but this technique requires a great deal of time and manual effort. However, it takes less than eight seconds to aerially plant an acre of land using seed broadcast by an airplane. Successful aerial seeding will provide an economical means of conducting large-scale planting for erosion control and reclamation.

The main objective of this research is to determine the most effective way to jumpstart smooth cordgrass seed and to powder-coat the enhanced seed to improve survival, stand density, planting precision and the success rate of aerial seeding. The next step is to enhance physiological and physical properties of the seed to better adapt to coastal environmental variables so that highly reliable aerial seeding techniques can be established.

Private Market Alternatives for Maintaining Wetland Viability in Coastal Louisiana: A Double-Hurdle Approach

Walter Keithly (LSU)
Richard Kazmierczak (LSU AgCenter)

Since 1930, Louisiana has experienced a net loss of more than 1,500 square miles of coastal wetlands. The state's remaining coastal wetlands are at risk, and 80 percent of these wetlands are under private ownership. While the public benefits of wetland protection and restoration projects are likely to be large, private benefits, measured by changes in net income to the landowner, are likely to be small and, potentially, negative. However, coastal landowner acceptance of and participation in restoration programs are critical.

The primary goal of this research is to develop an economically valid model that examines the factors that motivate private coastal landowners to participate in and generate income from their coastal wetland tracts. With this understanding, the investigators will then design potential policy instruments that provide incentives for private coastal wetland stewardship.

Role of Adjustable Longline Systems in Minimizing Accumulation of Potentially Pathogenic Vibrios in Oysters

Crystal Johnson (LSU)

Vibrios are naturally occurring bacteria that are responsible for thousands of gastrointestinal illnesses annually in the United States, largely due to the consumption of raw oysters. As oysters feed, vibrios accumulate in oyster tissue, and when the oyster is eaten raw, resident vibrios have the potential to cause gastroenteritis in consumers. In adjustable longline systems, oysters are grown in bags suspended in the water column on cables rather than on traditional oyster reefs. Based on the fact that sediment is such a rich source of potentially pathogenic vibrios, it is hypothesized that oysters harvested from estuary sediment carry higher vibrio densities than oysters suspended higher in the water column.

This project seeks to determine the difference in vibrio loads in the sediment and vibrio loads in the water column, and to determine the difference in vibrio loads in oysters cultured on-bottom and in off-bottom suspension.

Sediment Dynamics and Biogeochemical Cycling in a Developing Deltaic System: Understanding Land Building and Habitat Quality in a River Diversion

Alexander Kolker (Louisiana Universities Marine Consortium)
Brian Roberts (LUMCON)

Most experts agree that the best way to restore coastal Louisiana is to reactivate the natural deltaic land-building processes that originally built this system. This involves partially diverting Mississippi River flow, with the goal of bringing in sediments. However, freshwater diversions

have potentially negative impacts, and little is known about the interaction between land building processes and water quality in developing deltas.

This project seeks to examine the interactions between deltaic land building processes and sediment biogeochemical cycling rates, a key regulator of water and sediment habitat quality. By studying conditions at the naturally accruing Wax Lake Delta of the Atchafalaya River, researchers will provide valuable information for coastal managers developing future coastal land-building projects.

Wetland Restoration with Sediment Conveyance: An Experimental Approach to Reduce Uncertainties in Attaining Successful Restoration – Phase 2

Irving Mendelssohn (LSU)
Sean Graham (LSU)

During the last several years, state and federal resource agencies have implemented sediment conveyance projects for wetland restoration. However, barriers such as cost and ecological-physical uncertainties still exist that prevent the use of this method by individual landowners, municipalities and others.

The goal of this project is to reduce the ecological and geo-physical uncertainties related to the successful use of sediment-slurry restoration using small dredges. This research has three primary aims: (1) develop protocols for the successful use of a prototype mini-dredge to be used by landowners and resource agencies for marsh restoration and rehabilitation; (2) test metrics by which successful restoration of low-salinity, high-organic coastal wetlands can be assessed; and (3) determine the critical threshold for sediment burial that promotes functional equivalency with reference marshes.

Proposal Process

The LSG omnibus proposal solicitation process began in late 2010 with a call for statements of interest that addressed topics in the program's current Strategic Plan. Forty-five statements were received, which were reviewed by a 13-member screening panel. The authors of the 20 highest ranked statements were invited to submit full proposals. Sixteen proposals were received by the deadline for submission. All of the full proposals were subsequently examined by either two or three external peer reviewers. A 10-member technical review panel convened to review and score the entire set of full proposals. Prior to the technical review panel meeting, each panel member was assigned three full proposals to review. No consensus ranking discussions were held, but each panel member was asked to rank the proposal on a scale of 1-4, and a composite average score was determined for each submission.

"The people on our review panels make difficult judgments," said LSG Executive Director Chuck Wilson. "We are extremely grateful to them and to their colleagues who provided peer reviews of the proposals. Through the many steps in the selection process, we can be assured that Louisiana Sea Grant-funded research will help us meet the goals outlined in our new strategic plan."

Researchers Hope to Improve Efficiency of Restoration Spending

Louisiana Sea Grant researchers are working on a project to help maximize the return on dollars for coastal restoration in the northern Gulf of Mexico. These critical ecosystems are slated for billions of dollars in restoration spending in coming years as state and federal programs address a myriad of impacts resulting from population growth, coastal development, climate variability and natural and manmade disasters.

Rex Caffey, director of Marine Extension for LSG and a natural resource economist with the LSU AgCenter, heads up a team of six investigators involved in the project. Team members include natural resource economics professors Richard Kazmierczak and Walter Keithly of LSU, Daniel Petrolia and Matthew Interis of Mississippi State University and coastal science professor Irv Mendelssohn of LSU.

Their \$842,513 grant, jointly funded by the NOAA Coastal Services Center, the EPA Gulf of Mexico Program and the Gulf of Mexico Sea Grant Programs, will run two years. The project is titled "Integrating Revealed and State Preference Approaches for Ecosystem Valuation."

"The overall goal is to improve the efficiency of coastal restoration spending and to get the most out of limited dollars," said Caffey. "We want to examine how the societal benefits of specific habitats – marshes, oyster reefs and mangroves – compare to the costs to keep them up."

The researchers will derive estimates using a number of different methods, including direct value solicitation through surveys of Gulf residents; indirect assessments derived from public records of wetland tract sales and economic assessments of coastal insurance rates in Louisiana, Mississippi and Alabama.

Through development and comparison of alternative methods, the researchers hope to improve the accuracy of value estimation and improve the efficiency through which state and federal restoration program dollars are allocated.

"Future funding and support for environmental restoration programs will require the economic valuation of both market and non-market benefits," said Caffey. "In addition to generating specific ecosystem values, this project will provide guidance on the application of these estimates in the policy process."

Shirley Honored



Louisiana Sea Grant and LSU AgCenter Extension agent Mark Shirley (center) recently received the 2011 Extension Excellence Award from the AgCenter. Shirley was recognized for his dedication to helping people in southwest Louisiana protect and earn a living off the marshes and waterways in their communities. Shirley's territory includes Jefferson Davis, Vermilion, Acadia, St. Landry, Evangeline, Cameron, Calcasieu, Lafayette, Beauregard, and Allen parishes. Also pictured are Shirley's wife, Rebecca, and AgCenter Vice Chancellor Paul Coreil.

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Solar Food Drying for Developing Countries

Seafood technology specialist Lucina Lampila and aquaculture specialist Greg Lutz aided a Nigerian researcher studying solar fish drying techniques. Siyanbola Omitoyin, a fisheries specialist with Bowen University in Iwo, Nigeria, worked with the Louisiana Sea Grant/LSU AgCenter team during the fall 2011 semester.

"Nigeria has a lot of limitations, especially water and electricity," said Lampila. "Because of these limitations as well as the difficulty to preserve food, we wanted to study and perfect one of the earliest methods of food preservation – drying."

The project consisted of building drying stations – sealed, clear plastic envelopes – that use sunlight to heat and dry fish. Temperatures inside the envelopes reach more than 140 degrees Fahrenheit – more than adequate to dry and preserve the flesh.

"Along with measuring how quickly the fish dry, we also measured the safety of the process," said Lampila. "The product has to contain .85 or less water activity to be considered shelf stable. The goal was to optimize efficiency and safety in this type of food preservation so Siyanbola could

take these methods back to Nigerian communities."

Omitoyin is a United States Department of Agriculture (USDA) Borlaug Fellow. LSU International Programs with the collaboration of Lampila and Lutz were awarded a \$30,000 grant from USDA to study drying methods for 11 weeks at the AgCenter's Aquaculture Research Station in Baton Rouge. The variables used to dry different types of fish are meant to mimic Nigeria's wind speed, temperature and

humidity. Tilapia, catfish and shrimp were some of the species used, as they are plentiful in Nigeria.

The Norman E. Borlaug International Agricultural Science and Technology Fellowship Program helps developing countries strengthen sustainable agricultural practices by

providing scientific training and collaborative research opportunities to visiting researchers, policymakers and university faculty. The program has provided more than 500 fellowships for agricultural professionals from 64 developing countries worldwide. Omitoyin planned to return to Nigeria upon completing her fellowship to put the fish-drying methods into practice.



David Bankston, LSU Department of Food Science, Siyanbola Omitoyin and undergraduate student Joseph Bischoff build a food drying station.