LSU to Offer Stock Assessment Training

Louisiana State University will help address a critical need for fisheries stock assessment scientists with a new program. The curriculum will be offered through LSU's Graduate School as a multi-disciplinary effort involving the Department of Oceanography and Coastal Science, Biological Sciences, Geography and Anthropology, Economics, Experimental Statistics, Civil Engineering, Mathematics, Environmental Sciences and the School of Renewable Natural Resources.

"A recent report from NOAA (National Oceanic and Atmospheric Administration) identified a shortage of stock assessment scientists, partly because of looming retirements," said Jim Cowan, LSU professor of oceanography, who is helping organize the new program. Such expertise also is in demand since Congress reauthorized the Magnuson-Stevens Fishery Conservation and Management Act in 2007, increasing stock assessment scientists' responsibilities in monitoring nearly 700 marine species for the government.

Eighteen to 34, if not more, new stock assessment scientists – persons who have the ability to conduct high-quality research in fishery population dynamics and related fields – will be needed annually over the next ten years, according to "The Shortage in the Number of Individuals with Post-Baccalaureate Degrees in Subjects Related to Fishery Science" which was delivered to Congress in 2008. The report's authors estimate the nation's universities are producing about 16 such scientists per year.

The report lists about 30 courses necessary to create a curriculum for training stock assessment scientists. "All the courses listed are being taught now at LSU's Baton Rouge campus, although they may not have the same name used in the report," said Joseph Powers, associate professor of oceanography and the faculty member who will direct the program. "Additionally, Louisiana Sea Grant's Laborde Chair in 2010 will be another significant resource in establishing the program," he added.

Carl J. Walters, recipient of the 2006 Volvo Environmental Prize, will serve as the Laborde Chair beginning in the spring of 2010. Walters has been a professor in the Fisheries Centre and Department of Zoology at the University of British Columbia for 27 years. He also serves as an adjunct professor for the University of Florida's Fisheries and Aquatic Sciences Department and as a stock assessment research project leader at the Mote Marine Laboratory.

"Sea Grant is anxious to help facilitate this program," said Charles "Chuck" Wilson, Louisiana Sea Grant executive director and LSU vice provost. "Not only will it establish LSU as a center of excellence for stock assessments, and new approaches to stock assessments, it will develop stronger ties between Sea Grant and the National Marine Fisheries Service (NMFS)."

Stronger ties between LSU, National Sea Grant and NOAA will facilitate collaboration for research and education, Wilson added. Hopefully the university could then bring in scientists from other Sea Grant programs to teach and conduct research.

"The federal government has historically funded centers of excellence to create think tanks for a critical subject." Wilson said. "In the future, NMFS may station scientists at LSU to teach and research stock assessment. This move would put the greatest minds together to advance the discipline and allow our students to be the first beneficiaries. This would be a great plus for LSU and NMFS."

LSU currently has about 30 graduate students ready to enter the new program, said Powers. "We've even had students from other states contact LSU about the opportunity here," he added.

Currently the university is working to get the courses established as an official certificate that will be identified on transcripts. Scientists in NOAA fisheries and federal and state agencies can also earn the certificate without completing a degree program.

"It's a concept that needs to be brought to reality." Wilson said. "You build a curriculum and assure stakeholders that we offer it as an area of concentration."

Study Evaluates Reasons Businesses Reopened after Katrina

After Hurricane Katrina, four researchers from Louisiana and Texas embarked on a study to develop models related to business return after a catastrophe. Partially funded by the Gulf of Mexico Sea Grant programs, the group includes Nina Lam, a GIS expert and professor and chair of Louisiana State University Department of Environmental Sciences; Kelley Pace, director of the Real Estate Research Institute; Richard Campanella, assistant director at the Center for Bioenvironmental Research at Tulane University; and James LeSage, professor of finance and economics at Texas State University.

While many factors naturally influence business return decisions, Lam and her colleagues paid particular attention to the role played by a business' dependence on the return of other nearby businesses, i.e., "spatial dependence."

"Spatial relation is a variable to add to the traditional factors (size of business, type of business, etc.), so it is not replacing, but rather adding to the explanation," said Lam of the ability to identify why certain businesses reopened after the storm and others did not.

The study began within six weeks of the devastating storm in 2005. Certain findings were expected: heavily flooded business districts returned more slowly than others. Other findings were more surprising: locally-owned, independent businesses returned sooner than large, cash-rich chain stores (73 percent versus 47 percent within six months after Katrina).

Initially, the researchers thought that the major retailers, having more available capital and the ability to bring in outside resources, would give them an advantage. However, what they found was that the major retailers did not attempt to rebuild, but rather relied on their stores outside the district to service the local residents. If not severely damaged by the flood, independent businesses were more likely to reopen sooner than the chain stores because they needed to.

From a spatial perspective, a retail cluster attracts more customers than an isolated store, so it pays for retailers to cluster together – even under normal conditions. The researchers found that, during a disaster recovery period, a single retailer's return significantly helped all others in the cluster. Therefore, the more independent businesses in a cluster that can reopen after a disaster, the more everyone benefits. Magazine Street benefited doubly as a locus of high-end shops and boutiques that escaped flooding. Nearly all its businesses reopened within four months. Based on preliminary data, the business recovery models developed by Lam, Pace, Campanella and LeSage may make major contributions to recovery policy.

"Determining the spatial dependence of businesses in an area helps to better estimate the cost of a disaster," said Pace. "In addition, given finite recovery resources, spatially aware recovery strategies focus resources on particular clusters as opposed to smaller amounts being distributed over a wider area."

A possible outcome may be that aid given to a single business that is geographically connected to other businesses may spur more economic activity than aid given to isolated businesses.

Given that the models have potential application for a variety of disasters, the findings of the project will be widely published. Already, the researchers have presented their findings in various public hearings, news features, and national geographical science and spatial econmetrics conferences.

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Reef Balls Create Inviting Habitat in Lake Pontchartrain

Invertebrates, fish and crustaceans in Lake Pontchartrain now have a few new places to live – 600 to be exact – with the completion of Phase II of the Lake Pontchartrain Artificial Reef Program.

The 600 individual "reef balls" have been clustered on the waterbottom to form larger reefs in four sites – two in St. Tammany and one each in Orleans and St. Charles parishes. The program is spearheaded by the Lake Pontchartrain Artificial Reef Working Group, comprised of the Lake Pontchartrain Basin Foundation (LPBF), Louisiana Sea Grant, the LSU AgCenter and the Coalition to Restore Coastal Louisiana. It was formed to create habitat and improve recreational fishing. Phase I of the project introduced an acre of limestone rubble near the New Orleans Lakefront Airport and four reef ball sites during 2000 to 2004.

John Lopez, director of the LPBF's Coastal Sustainability Program, said the reef balls are a more attractive alternative to the limestone initially used because of their price and ability to offer animals a break from currents.

"You get a better reef for about a third of the cost," Lopez said.

Manufactured and deployed by Coastal Reef Builders of Pensacola, Fla., the hollow, spherical concrete "condos" used in Lake Pontchartrain are open on the bottom, covered in holes and come in three sizes – two-, three- or four-feet-tall, depending on water depth and the draft requirements of the area. Phases I and II created a total of nine reefs, distributed widely across the lake.

Reef balls being placed in Lake Ponchartrain to form habitat for fish.

"It offers habitat diversity that is rare in Lake Pontchartrain," explained Mark Schexnayder, a Marine Extension agent with Louisiana Sea Grant and the LSU AgCenter, who has worked on the project and is a leader in urban fisheries initiatives in the New Orleans area. "The lake is very shallow and has a flat, featureless bottom. When you add anything that breaks the current, it tends to concentrate bait, which concentrates fish for fishermen."

Project coordinators admit that they cannot gauge the full impact of the artificial reefs, but Lopez said these created habitats typically attract sheepshead, speckled trout and occasional white trout. Additionally, divers have found pogies, jack crevalle and blue crabs, utilizing the structures. Lopez said their most surprising find was molting blue crabs, noting that it is more common for the soft and shedding crabs to retreat to grass beds during this vulnerable stage.

Concrete reef balls come in three sizes.

The artificial reefs also provide a hard substrate that some animals can adhere to. These animals in turn attract sheepshead and drum. Other sport fish are drawn to the small crustaceans that are attracted by the break in current. Lopez said he expects several fish species to migrate from site to site.

"Monitoring of the Phase I sites in subsequent years provides most of what we know about these reefs in Lake Pontchartrain," Lopez said. The total cost of Phase II is $160,000, including monitoring.

Technical and financial support was provided by the Louisiana Department of Wildlife and Fisheries, the National Oceanic and Atmospheric Administration Restoration Center, the Coalition to Restore Coastal Louisiana, Shell Exploration and Production Inc., the Jefferson Parish Marine Fisheries Advisory Board, the Louisiana Office of Coastal Protection and Restoration, T. Baker Smith and the University of New Orleans.

"Everybody is enthusiastic about this project," Schexnayder said. "It opens up a lot of fishing opportunities in the Greater New Orleans area. People actually can go fishing in the afternoon after work, have a good experience and be home before dark rather than trailering their boats and having to drive two hours to find a fishing spot."

Anglers fishing for GPS coordinates can find them online at the reef program Web site: Lake Pontchartrain Artificial Reef Program: *http://www.saveourlake.org/recmap.htm*

On the Web:

Lake Pontchartrain Basin Foundation:
www.SaveOurLake.org

Louisiana Sea Grant Fisheries:
http://www.seagrantfish.lsu.edu/

Coastal Reef Builders:
http://www.reefball.org/crb/

C O A S T A L C L I P S

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Oysters Hatchery to Relocate

Destroyed by Hurricane Katrina in 2005 and again by Hurricane Gustav in 2008, Louisiana Sea Grant's oyster hatchery on Grand Isle is moving to the new, state-of-the-art Louisiana Department of Wildlife and Fisheries research facility on the island. Although the remains of the old hatchery – seen in the reflection of LSG oyster researcher John Supan's sunglasses – are partly functional, the new hatchery will be more storm resilient and offer better facilities. It will be fully operational by March 2010. Research at the hatchery revolves around developing disease-resistant oyster strains, testing potential oyster cultch material and producing triploid oysters for high summertime meat yields. Also reflected in Supan's glasses is LSG Executive Director Chuck Wilson (left) and NOAA Program Officer Gene Kim with the National Sea Grant College Program.

Bringing Aquatic Access Under One Umbrella

Louisiana is a land of water bodies, but locating access points on our vast lakes, bayous, rivers and offshore areas isn't always easy. Existing data on marinas, boat launches and other waterfront facilities are largely incomplete, duplicated or out-of-date.

With Sea Grant support, Robert Cunningham and Elaine Evers, research associates with LSU's School of the Coast and Environment, seek to remedy this dearth of accurate information. Their project grew from the needs of emergency responders reacting to waterborne oil spills, but they are expanding it for the benefit of recreational and commercial boaters as well.

The duo is compiling information from three sources – Louisiana Sea Grant's (LSG) Marina Directory, the Louisiana Department of Wildlife and Fisheries' (LDWF) list of boat launches, and the Louisiana Oil Spill Coordinator's Office's (LOSCO) database. They are calling on agents from LSG and LDWF to investigate, verify and update existing records.

The end product will be an easily updated online database. Designed only for government and emergency response agencies, the main database will include private, government, restricted and commercial facilities that can be employed in a crisis. Researchers will include a subset of the database, accessible to anyone, that details only marinas and launches open to the public.

"With the frequency of hurricanes impacting Louisiana, we realized the need for a database that can be updated frequently," Evers said. "We also want to avoid a duplication of effort among agencies who currently collect and maintain this information."

"This will benefit Sea Grant, LOSCO and the Louisiana Department of Wildlife and Fisheries," explained Cunningham. "It will be updatable by Sea Grant personnel. Presently, Sea Grant maintains a marina directory in PDF format that is updated approximately every two years. Our project will offer to the citizens of Louisiana a dynamic online database."

The searchable database will be in both GIS and Google Earth formats, and Cunningham and Evers expect it to be completed by the end of the year.

On the Web:

Louisiana Sea Grant Marina Directory:
http://www.laseagrant.org/pdfs/Marina Directory07.pdf

Louisiana Oil Spill Coordinator's Office:
http://losco.state.la.us/

Louisiana Department of Wildlife and Fisheries boat launches:
http://www.wlf.louisiana.gov/fishing/wheretofish/boatlaunches/

Extension Leader Announced

Dr. Glenn Thomas has been named the director of Marine Extension for the Louisiana Sea Grant College Program and the LSU AgCenter. Thomas has been with Louisiana Sea Grant since 2004, initially serving as an Extension agent for St. Martin, St. Mary, Iberia and Iberville parishes, and most recently as state-wide fisheries specialist.

"Glenn has excelled while at Sea Grant and he has proven his leadership ability. I have no doubt he will do an exceptional job as director of Marine Extension," said Dr. Charles Wilson, Louisiana Sea Grant executive director. "He certainly was a stellar candidate from a pool of outstanding candidates we had from across the country," Wilson added.

"We are pleased to get such a qualified and experienced marine fisheries specialist in this important leadership position," said Dr. Paul Coreil, LSU AgCenter vice chancellor and extension service director. "Glenn brings with him excellent experience and program vision that will be important as Louisiana Sea Grant addresses the challenges facing coastal community sustainability and commercial and recreational fisheries."

Thomas earned his bachelor's degree in biology from Augusta State University in Georgia, master's in wildlife and fisheries science from the University of Tennessee in Knoxville, and his doctorate in wildlife and fisheries science from Louisiana State University. He also spent 11 years working for the Louisiana Department of Wildlife and Fisheries, in both marine fisheries and inland fisheries management.

"It's an honor to work in such a rare organization that gives its personnel the freedom to prioritize their goals and the support to accomplish them," said Thomas. "I really look forward to starting this next chapter in my career at Sea Grant."

The Marine Extension Program is jointly funded and managed by Louisiana Sea Grant and the LSU AgCenter's Cooperative Extension Service. It consists of 13 agents and specialists located throughout the state's coastal zone who conduct outreach, education and applied research to enhance coastal environmental and economic sustainability.

Sea Grant Law Clerk Wins Writing Competition

A Louisiana Sea Grant Law and Policy Program legal research assistant won first place in the Louisiana State Bar Association's 18th Annual Environmental Law Essay Contest. Cole Garrett, who graduated from the Paul M. Herbert Law Center at LSU in May 2009, served as a LSG law clerk for two years.

"Cole has great researching and writing skills," said Melissa Daigle, LSG Law and Policy legal coordinator. "He is also exceptionally good at reading a case and pulling the meaning out. Some court decisions are 80 pages or more, so it is important to understand the meaning of the case as a whole to apply the law discussed to a different set of facts. Cole is also very good at foreseeing the ramifications of decisions."

Garrett's paper, "'Taking' Responsibility for Land Use Regulation," studies the federal takings doctrine to see what choices state and local governments may have in promoting hazard mitigation and risk reduction without compensating land owners for loss of their property. The paper argues that the best choice for state and local government to successfully plan land use is to take a "No Adverse Impact" approach. This approach would avoid takings claim lawsuits.

Law students from the Hebert Law Center, Loyola University New Orleans College of Law, Southern University Law Center and Tulane University Law School are eligible to participate in the writing contest. Entries must address important problems or issues in environmental law. As the first place winner, Garrett will receive $2,000.

"The contest gave me the experience of writing an academic paper and increased my knowledge on the federal takings clause and land use regulation," Garret said. "Hopefully it will be an achievement on my resume that could open doors as I pursue a career in environmental law."

Garrett's full paper will appear in LSG's Law and Policy Program's *Louisiana Coastal Law* newsletter.

As an undergraduate, Garrett majored in biology and business management at the University of Texas at Austin, not far from his hometown, Mountain Home. At UT, Garrett discovered his interest in law and regulation of natural resources and decided to pursue a career in environmental law.

LSU Sports NMFS Fellow

Louisiana State University graduate student Melissa Hedges Monk is a 2009 National Marine Fisheries Service (NMFS)/Sea Grant Fellow in population dynamics. Monk, a doctoral student in oceanography and coastal science, is one of only seven students nationwide selected for the fellowship.

Joseph Powers, Melissa Hedges Monk and Chuck Wilson

Monk will conduct research to pinpoint indicators from a historical fish survey that show how fish communities in the Gulf of Mexico changed over time. The study will specifically examine red snapper, a species that is currently recovering from years of overfishing.

"One question we're asking is: As we increase the number of red snapper, how will it affect other fish species in the ecosystem?" Monk said.

"We also want to incorporate the indicators into mathematical models used to manage the species and determine how many fish can sustainably be caught."

Monk's fellowship began June 1 and will continue for three years. During that time she will work with fisheries scientists and spend at least one to two weeks on a research cruise each year. She will not work directly with the fish, but will build models from the data collected.

Joseph Powers, associate professor of oceanography at LSU, will serve as her advisor and major professor. Elizabeth Brooks, a stock assessment scientist for the NMFS Northeast Fisheries Science Center in Woods Hole, Mass., will mentor Monk.

Monk first got involved with NMFS stock assessments through the agency's Recruiting, Training and Research Program at Virginia Tech. She ultimately hopes to land a position with NMFS as a stock assessment scientist.

Monk, a native of Haymarket, Va., studied wildlife science for her undergraduate and master's degrees at Virginia Tech. She decided to change her focus to marine science after working as a sea turtle biologist during a fellowship with the Bald Head Island Conservancy.

The National Sea Grant Office and NMFS created the Graduate Fellowship Program in 1999 for population dynamics and marine resource economics. Each fellowship provides $38,500 per year to cover a stipend, tuition and travel, depending on the availability of federal funds. For more information or to apply, contact Louisiana Sea Grant, or Terry Smith at *Terry.Smith@noaa.gov.*

Saltwater Fishing Task Force Cast in Important Role

Recreational saltwater fishing is big business in Louisiana, having an annual economic impact in excess of $750 million. Recognizing the sport's importance, the 2008 Legislature created the Louisiana Recreational Saltwater Fishing Task Force to help state agencies manage, develop and promote the industry.

"The goal is to have the task force help the Louisiana Department of Wildlife and Fisheries (LDWF) in making policy decisions," said Lara Ballard, LDWF executive staff officer assigned to the task force. "If you look at the makeup of the group, you'll immediately see there is a great deal of diversity. There's an outdoors television show host, a marina owner and a spearfishing enthusiast."

Prescribed by the legislation that created the task force, voting members consist of representatives from the Coastal Conservation Association, Charter Boat Association, Wildlife Federation, Marine and Motorcycle Trade Association, retail tackle industry, marina owners, bait industry, spearfishing sector and recreational saltwater fishermen. Non-voting members include a fisheries biologist as well as an enforcement officer and economist from LDWF, a fisheries scientist from Louisiana State University, an economist or sociologist from the University of Louisiana System and a representative from Louisiana Sea Grant.

Since formally organizing this spring, the task force has met several times for briefings on fisheries management and to discuss issues and consider topics they would like to tackle. "They've got a lot of momentum and are really ready to roll up their sleeves and work," said Ballard. The group will meet quarterly once it establishes its rules of procedure. All meetings are open to the public.

"This is really an outstanding group of people who will get things done," said Louisiana Sea Grant and LSU AgCenter Extension Agent Mark Schexnayder, who is a non-voting member of the task force. "One of the ideas already floated – digitizing and making available online fishing locations, marinas, guides and shore-side fishing opportunities, as well as past Wildlife and Fisheries publications like *Louisiana Conservationist* – has been embraced 100 percent, and the wheels have been set in motion."

Other ideas on the table include expanding fishing education through scouting groups, 4-H, state parks and university outreach programs; modernizing bait shrimp fishing regulations; and exploring the concept of a fishing park.

Louisiana Recreational Saltwater Fishing Task Force Roster

Voting Members:

David Cresson – CCA of Louisiana
C.T. Williams – Louisiana Charterboat Assoc.
Clint Ourso – Louisiana Wildlife Federation
R.P. Breaux – Louisiana Marine and Motorcycle Trade Association
Barry Songy – Retail Tackle Industry
Bobby Gros – Marina Owners
Robert Campo – Bait Industry
Daniel McKinzey – Spearfish Sector
Eric Newman – Recreational Saltwater Fishermen

Non-Voting Memmbers:

Michael Harbison – LDWF Fisheries Biologist
Ed Chesney – LSU Fisheries Scientist
Jeff Mayne – LDWF Enforcement Agent
Jack Isaacs – LDWF Economist
Rand Ressler – UL Economist
Mark Schexnayder – Louisiana Sea Grant

DARPP Employee Honored for Her Work

Jean Cowan, in the Damage Assessment, Remediation and Restoration Program (DARRP) under NOAA's Restoration Center, is working to restore natural resources in the Calcasieu River damaged on June 19, 2006, when heavy rains caused approximately three million gallons of oil to spill from a storage tank into the ship channel. This is just one of many oil spill and hazardous waste cases involving several companies that Cowan works in Louisiana and Texas.

Jean Cowan

At the time of the spill in the Calcasieu River, Cowan was employed by the Louisiana Department of Natural Resources (DNR), and on detail to the Coastal Protection and Restoration Authority (CPRA). But a desire to be more involved in technical work lured her to DARRP in December 2007 to work as a marine habitat resource specialist. As such, she acts as a trustee, or representative, for the public's interest.

DARRP is a program in NOAA that involves three line offices – the National Marine Fisheries Service Restoration Center, NOS Assessment and Restoration Division, and Office of General Counsel for Natural Resources. NOAA and other federal and state natural resource agencies serve on the trustee council, to determine the injuries caused by oil and other hazardous materials spills that can damage the environment, and then build restoration projects to compensate for these injuries. Cowan's office works on identifying proper restoration methods and implementing projects that will restore the damaged or lost resources. Her office also implements restoration projects for coastal and marine habitats to offset effects of subsidence, erosion and disruption of natural processes.

Cowan stressed that DARRP does not use damage assessments and restoration to punish companies responsible for environmental damages. State and federal legislation encourage companies to help with the assessment and restoration process.

"These chemical companies and oil companies are important for our communities," said Cowan. "They provide products nationally and globally, and they provide jobs locally.

"The restoration process is not a punitive process. It is all about restoring damaged resources and compensating the public for those losses. That's also where attorneys come into play. They make sure things are done fairly in terms of the law," she said.

Prior to joining NOAA, Cowan was a member of the Integrated Planning Team for the CPRA. The team consisted of staff from the Louisiana Department of Transportation and Development and the Louisiana Department of Natural Resources, who coordinate levee projects and coastal restoration efforts. Implementation of the plan is now managed by the state's newly created Office of Coastal Protection and Restoration.

The state created the team to change its approach to providing for coastal sustainability following the 2005 tropical storm season. Cowan, then employed at DNR, was recruited to work with the team on creating the state's Comprehensive Master Plan for a Sustainable Coast – a guide for integration of coastal restoration and hurricane protection projects. The team of eight was responsible for leading and conducting everything from public meetings, to creating the technical document, to producing data and utilizing scientific models. Few countries in the world have attempted such a plan.

"Other than the Netherlands and the United Kingdom, I don't know any government that has really, purposefully tried to do this in an integrated fashion." Cowan said. "We didn't have a blueprint and we couldn't look to another state or community within the United States for that.

"The United Kingdom has faced the implications of its coastal erosion issues and has developed strategies for protection, or retreat, of various communities in the future, as is appropriate. We drew a lot from the planning that they did. In fact we worked with one of their consultants who helped develop the guidance for their shoreline management plans."

Cowan and the rest of the team received the National Association of Environmental Professionals 2008 President's National Environmental Excellence Award for the plan. The NAEP's award recognized the vision in integrating coastal restoration, the concerns and needs of coastal Louisiana residents and the fishing industry, and hurricane protection.

Cowan holds an undergraduate degree from University of Virginia in environmental science. She studied microbiology and statistics in the University of Maryland's continuing education program. In graduate school at the University of South Alabama she earned a Master's degree in marine biology. Her office is housed in the Louisiana Sea Grant Building on LSU's Baton Rouge campus.

LSG Receives Environmental Communication Award

The Louisiana Sea Grant College Program communications office has received a 2009 Eco Award of Merit in Environmental Communications for its educational multimedia CD "Marsh Mission."

The disc allows students to explore the coastal marshland through the eyes of celebrated naturalist and photographer CC Lockwood, acclaimed landscape painter Rhea Gary and educator Sue Lockwood. The trio shares the story of Louisiana's vanishing wetlands through their images and words in two powerful talks on the disc. Along with their presentations, the CD contains *The Rise and Disappearance of Southeast Louisiana* by Dan Swenson, coastal stewardship messages from Peyton and Eli Manning, and other educational resources.

Global Environmental Communications LLC, which sponsors the competition, received more than 170 entries from professional communicators and organizations. Award winners are selected on the overall effectiveness of the environmental communication. Only 42 contestants received Awards of Merit. Copies of the free Marsh Mission disc are available by sending a request to *jsche15@lsu.*