MATRIX V: Campus STEM Research Priorities Report
Categories Aligned with FIRST Louisiana High Growth Target Industries
Coastal Resilience - DRAFT

	Research Priorities Aligned with High Growth Target Industries	Specific Research Foci/Strengths
LSU AG	• Recent Release and Licensing of Three Coastal Plant Species	• Recent release and licensing of three coastal plant species for revegetation of created wetlands in Lousiana coastal areas

LSUBR	• Coastal Sustainability & Environment	• Restructuring of the Coastal Studies Institute into a research unit with resources from the Office of Research & Development and the Graduate School
		• NSF IGERT submission (under review) on sustainable deltaic coasts
		• Office of Research & Development working with the Coastal Sustainability Studio to facilitate collaborations with social sciences & humanities and consolidate non-STEM research strengths on coastal communities into a more cohesive portfolio, bridge STEM/non-STEM faculties, and establish LSU as the epicenter of community-level research on coastal issues in the region
		• New director of Louisiana Sea Grant College Program (Dr. Robert Twilley)
		• Submission of Coastal SEES (Science, Engineering and Education for Sustainability) proposal to NSF
		• Success Stories
		  ◦ $1.5 million NSF grant to investigate the sustainability of coastal communities, focused on the Lower Mississippi River Basin in Louisiana
		  ◦ Dr. Joshua Kent research, funded by the Gulf Coast Evacuation & Transportation Resiliency Program and the US Department of Transportation, to assess the vulnerability of hurricane evacuation routes in coastal LA to storm surge and flooding events

	• Core Computing/High Performance Computing	• Cutting-edge research in Computer Science, Computer Information Systems, Cyber Engineering, Geographic Information Systems, and Health Informatics.
		• Research agenda includes cybersecurity, cybernetics, data mining, sensor fusion, information assurance, biomedical informatics, data analytics, and communications design
		• Center for Secure Cyberspace
		• Center for Entrepreneurship and Information Technology
		• Center for Information Assurance
		  ◦ Success Stories:
		  ◦ National Center of Academic Excellence in Information Assurance Research & Education
		  ◦ B.S. in Cyber Engineering

	• Materials Science & Engineering	• Leadership of Dr. Ward Plummer • New 85,000 SF Chemistry and Materials building • Plan to facilitate a self-sustaining instrumentation facility • Working toward establishment of an Institute for Advanced Materials

	• Individual Behavior & Community Context	• Research on individual behavior and cognitive aspects of varied social phenomena such as health, crime, developmental trajectories over the life course, and socioeconomic attainment, and how historical and community contexts produce differential outcomes
		• Baton Rouge Area Violence Elimination Program (BRAVE) and resulting grant to study the Group Violence Reduction Strategy in Baton Rouge
		• Several research groups, with one focused on health behaviors and health communication
		• Supportive research infrastructure includes the Office of Social Service Research and Development and the Public Policy Research Lab
		• Success Stories
		  • BRAVE partnership
		  • Division of Economic Development partnership with/contract work for LED and other State agencies

	• Communication & Expression	• The scientific, humanistic and artistic dimension of the human communicative experience and how they intersect with and augment in novel ways the process of discovery
		• Key cluster in political science
		• Media Effects Lab
		• Participation in the Alliance for the Arts in Research Universities
		• Focal area in Cultural Computing
		• Success Stories
		  • Swine Palace Theatre
		  • Language Development and Disorders Lab research in child language development and disorders

LA Tech	• Infrastructure, Energy & Environmental Systems	• Disciplines of engineering, fundamental science, and applied sciences to develop solutions for infrastructure, energy & environmental challenges
		• Research agenda includes advanced materials for sustainable infrastructure, energy harvesting, alternative energy, transportation systems, water and coastal modeling and support
		• Trenchless Technology Center
		• Institute for Micromanufacturing
		• Success Stories:
		  • Louisiana Technology Product of the Year (Erez Allouche: “green” concrete technology)
		  • NSF CAREER Award (Dr. Niel Crews: “Thermal Gradient Microflow Calorimetry using Anisotropic Temperature Sensors”)

	• Matter, Materials & Multiscale Systems	• Disciplines of engineering, computer science, chemistry, physics & mathematics
		• Research topics include micro/nanotechnology for energy, security, and sustainability applications, microfabrication and materials characterization, nuclear and high energy physics, computational electromagnetics and metamaterials, computational materials science & advanced materials and manufacturing
		• Institute for Micromanufacturing
		• Center for Applied Physics Studies
		• Louisiana Alliance for Simulation-Guided Materials Applications (LA-SiGMA)
		• Success Stories:
		  • NSF CAREER Award (Dr. Leland Weiss: new methods to capture and use solar thermal energy using small-scale devices
		  • Particle Physics image (a summary figure of “inclusive jet production”) selected as international standard

	• STEM Education, Entrepreneurship & Innovation	• Support FIRST LA framework as a whole by educating post-secondary and post-graduate students in all foundational sciences
		• Facilitate innovations in core domains, and ultimately contribute to all target industries
		• Integrated STEM Education Research Center
		• Science and Technology Education Center
		• Center for Entrepreneurship and Information Technology
		• Proof of Concept Center
		• Success Stories
		  • US Department of Homeland Security funding for Cyber Discovery Camp
		  • US Economic Development Administration funding for “i6 green energy challenge”

Loyola	• Environmental Biology & Chemistry	• Includes ecology, conservation, natural history, population genetics, mathematical biology, atmospheric chemistry & green chemistry
		• Animal studies/surveys
		• Plant studies
		• Microbial studies
		• Atmospheric chemistry
		• Green chemistry
		• Summer Collaborative Outreach and Research Experience
		• Center for Environmental Communication
		• Center for Environmental Law & Land Use
		• Success Stories:
		  • Dr. Patricia Dorn keynote address at the Second International Workshop on Chagas Disease
		  • Dr. Aimee Thomas and Dr. Kristy Halverson NSF award to adopt an innovative environmental science training program

	• Materials Science and Spectroscopic Analysis	• Includes systems and novel analysis of systems
		• Novel measurement of transport properties
		• Crystallography of isometric organic catons with extraordinary structures
		• Cavity ring-down spectroscopy
		• Success Stories
		  • Dr. Patrick Garrity discovered a way to decouple heat flow from electrical currents and apply the technique to thermoelectric power generation
		  • Dr. Lynn Koplitz published five articles on the crystallography of compounds containing isomeric organic catons

LUMCON	• Sustainability of Clean and Adequate Water Supplies for Multiple Uses	• Leverage the Water Institute of the Gulf to help foster university-industry collaborations in coastal and river protection • Coastal Protection and Restoration Authority (CPRA) Master Plan – use of the Mississippi River as a critical tool in coastal restoration • LUMCON partners with industry representatives to develop adequate and appropriate water quality monitoring networks; current collaboration with XYLEM for water quality stations at Cocodrie and Terrebonne Bay
	• Opportunities for Collaboration	• LUMCON Marine Center Phytoplankton Taxonomy group working with CPRA and the LA Department of Environmental Quality • Opportunities for LA DEQ to forge cooperative agreements with industry and wastewater treatment facilities to reduce excess nitrogen disposal, with LUMCON playing a role • LUMCON is experienced and poised to serve as a facilitator and contractor for research awards for TWIG, should it become the Center of Excellence for RESTORE Act funds
	• Promote Statewide Commercialization Mechanisms and Advance Enabling Technology	• Unique capabilities in propagation of larval fish for aquaculture and experimentation • Industrial ties position LUMCON to improve culturing and raising facilities, and develop standard toxicological techniques for determining the effects of oil spill or other toxicant exposures • Work with oil and gas industry: water quality monitoring (hypoxia and related parameters) and delivery of real-time data from multiple offshore stations • Work with oil and gas industry: use of decommissioned oil platforms for artificial reefs
PBRC		

SUBR	• Health & Biological Sciences	• Vision: To advance public health research, policy, practices and education by fostering collaboration across disciplines for the improvement of the public's health and wellbeing; to strengthen the University's capacity to address strategically and effectively complex public health issues
		• Nurse-managed clinic
		• Center for Social Research
		• Success Stories
		  • School of Nursing's Family Health Care Center
		  • Louisiana Biomedical Research Network (LBRN) collaboration with LSUBR

	• Energy, Ecosystems & the Environment	• Vision: To build on current sustainable energy-oriented research strengths and to develop new, technically significant research programs; to understand mechanisms driving, and to develop potential solutions for, alternative energy materials, carbon emissions and climate change problems
		• Success Stories
		  • Next Generations CREST Composite Center
		  • Research Project: Developing Biofuels from Sustainable Alternative Non-Food Feedstocks in Louisiana

Tulane	• Water Remediation, Management & Coastal Studies	• Internationally recognized programs in wetlands restoration, disaster resilience, water resource policy, and dispersant technology • Major focus areas: river processes (hydrology, water law); Delta processes (wetland ecology); ecosystem services (fisheries management); and human dimensions (disaster resilience, public health) • Tulane Institute on Water Resources & Policy • Tulane Xavier Center for Bioenvironmental Research • Collaborative role in the 22-institution Consortium for the Molecular Engineering of Dispersants (CMEDS) funded by the Gulf of Mexico Research Initiative (GOMRI) • Success Stories: Dr. Mark Davis (law and policy); Dr. Mike Blum (hybridization and adaptive evolution); Dr. Vijay John (microemulsion systems & thermodynamics)
	• Energy & Environmental Science	• Internationally recognized programs in energy sources, energy management & environmental sciences • Major focus areas of biofuels, sedimentology, sea-level change & energy supply chain economics • Tulane Energy Institute • Tulane University Biodiversity Research Center • Clean Power and Energy Research Consortium (multi-institutional collaboration) • DOE National Institute for Climate Change Research (multi-institutional collaboration) • Success Stories: Dr. Geoff Parker (markets and supply chains); Dr. Tor Tornqvist (evolution of rivers, oceans and shallow oceans); Dr. David Mullin (alternative fuels/liquid fuels); Dr. Henry Bart (taxonomic/ecological diversity and environmental adaptation)
TUHSC	• Environmental Health	• Domestic and international programs in health disparities research, environmental epidemiology, water and air quality, nutriceuticals, sustainable hazardous waste management, molecular toxicology and biomarkers, carcinogenesis, health and public policy, disaster preparedness, and management • Significant translational research through direct impact of research programs on human health with specific endpoints of cancer, respiratory disease, asthma, gastrointestinal disorders, workplace health, and reproductive health • Tulane Xavier Center for Bioenvironmental Research • Center for Applied Environmental Public Health • NIH-funded Transdisiplinary Research Consortium for Gulf Resilience on Women's Health (GROWH) • Baton Rouge Area Foundation-funded project on environmental disaster resilience • Collaborations with Xavier through CBR and all LA research universities through the Louisiana Universities Gulf Research Consortium (LUGRC) • Major source of translational research & commercialization, with on product on the commercial market and others in the pipeline • Success Stories: Maureen Lichtveld, Roy Rando, LuAnn White

ULL	• Coastal Ecology & Water Management	• Research agenda: precipitation inputs; in/out groundwater resources; riverine inputs; runoff inputs; contaminated water discharges; Mississippi River discharge; incoming salt water; water-impacted sensitive ecosystems; 'normal' and 'abnormal' events; species management; ecosystem management; point discharge management; hydrologic system management; non-point discharge management; and sociological and economic impacts
		• Institute for Coastal Ecology and Engineering
		• National Incident Management Systems and Advanced Technologies (NIMSAT) Institute
		• Success Stories
		  • Two teams awarded more than $2.3 million by the Gulf Research Institute to study effects of the 2010 Gulf oil spill on the Gulf of Mexico ecosystem
		  • Hydrologic Modeling projects (modeling the Mekong River; Modeling the impact of nutria on Louisiana marsh; satellite-based rainfall estimations over the Nile basin) impact policy
		  • Collaboration in the Northern Gulf Coast Hazards Collaboratory (NSF funded)
		  • USGS National Wetland Research Center
		  • Institute for Coastal Ecology and the Environment
		  • Center for Louisiana Inland Water Studies
		  • NIMSAT Institute – risk assessments
		  • Several industrial partnerships

ULM	• Agricultural, Biological & Environmental Advancements	• Agricultural, ecological & environmental research to maximize safe and effective use of natural resources
		• Success stories
		  • Researchers study the popular chloraceteanilide herbicides (toxicity)
		  • Researchers test natural antimicrobials to inhibit the growth of food toxins
		  • Faculty and students pioneered a novel way to determine impact of pollutants on amphibian resistance to pathogens

UNO	• Coastal Resilience	• Center for Hazard Assessment, Response and Technology (CHART) and the Pontchartrain Institute for Environmental Sciences (PIES) focus on community resilience and coastal/wetlands research
		• Success Stories
		  • CHART has developed the Risk Literacy Manual to teach concepts of risk through literacy programs
		  • CHART FEMA funding to implement mitigation outreach and education projects
		  • PIES conducts key research to provide a safer environment for Louisiana and New Orleans in particular
		  • UNO participation in the Coastal Sustainability Consortium
		  • PIES maintains the Coastal Louisiana Resource Information System (CLARIS) and the Pontchartrain Basin Clearinghouse
		  • Phase I SBIR grant with DQSI researching and developing high performance computing to address NASA's Earth Science Applied Research and Decision Support mission