

Coastal Science Assistantship Program Application

(Enter requested information in the gray boxes; they will expand as is necessary)

Name: Dr. Mark W. Hester

Address: Coastal Plant Ecology Laboratory, Department of Biology, P.O. Box 42451, Lafayette, LA 70504

Institution: University of Louisiana at Lafayette

E-mail address: mhester@louisiana.edu

Student's graduate degree major (please attach degree requirements): *MS Biology* (with emphasis on Coastal Restoration Ecology). Degree requirements stated in the Narrative

Anticipated date of acceptance of student: Summer 2015

Anticipated date of graduation: Spring 2018

****Note – Louisiana Sea Grant requires that overhead (F and A) charges be waived for this funding.**

Proposal narrative

- Provide a brief (two page maximum) description of the research that would be conducted as part of the recruit's Master's degree at your institution. This does not have to be exact as we anticipate the student will play a role in developing specific research objectives as part of this learning experience. Explain how this research is of interest to the Coastal Protection and Restoration Authority (CPRA) and how it fits within the 2012 CPRA Master Plan (see: [THE MASTER PLAN - Coastal Protection and Restoration Authority of Louisiana](#)).
- Outline the anticipated curriculum for the student including the classes that the student might take.
- Provide a description of current or anticipated funding sources that will be applied to support the research activities proposed for your student. This must include full disclosure of any employment, agency or other contractual and/or funding agreements to which the applicant, or anyone else participating in their research, are bound or intend to become bound involving any party to the litigation pending before the United States District Court for the Eastern District of Louisiana captioned "In re: Oil Spill by the Oil Rig 'Deepwater Horizon' in the Gulf of Mexico on April 20, 2010", MDL No. 2179 ("Oil Spill Litigation"). Applicants must establish that no conflict of interest exists regarding any existing or anticipated contractual and/or funding agreements and the receipt of research funding from CPRA under the CSAP program. The applicants selected for funding also agree to make CPRA aware of, and obtain CPRA's prior written approval, before (i) accepting any funds from any party to the Oil Spill Litigation, (ii) providing any services or conducting any research that is in any way oil spill related, or (iii) becoming involved

in any other work, research and/or projects that could potentially affect the State of Louisiana's claim for natural resource damages in the Oil Spill Litigation¹.

Note: A condition of this award is completion of an internship of 240 hours at a CPRA office during the period of the CSAP funding.



Signature of applicant

Submit Applications to:

CPRA Coastal Science Assistantship Program
C/O Louisiana Sea Grant College Program
232 Sea Grant Building
Louisiana State University
Baton Rouge, La 70803-7507
Or via email to Katie Lea at klea@lsu.edu

¹ The following is a list of the parties to the Oil Spill Litigation to which conflicts may apply for purposes of a student's receipt of CSAP funding: (i) the Defendants include: BP Exploration & Production, Inc., BP Corporation North America, Inc., BP America, Inc., BP America Production Company, BP p.l.c., Anadarko Exploration & Production LP, Anadarko Petroleum Corporation, Transocean Holdings LLC, Triton Asset Leasing GmbH, Transocean Deepwater, Inc., Transocean Offshore Deepwater Drilling, Inc., Transocean Ltd., Halliburton Energy Services, Inc., and (ii) the non-Louisiana plaintiffs include: the United States of America (including the following federal agencies: the Department of Justice; the Department of Commerce National Oceanic and Atmospheric Administration; the Department of Interior Fish and Wildlife Service, National Park Service, Bureau of Land Management; the Environmental and Protection Agency; the Department of Agriculture; and the Department of Defense), the Alabama Department of Conservation and Natural Resources, the Geological Survey of Alabama, the Mississippi Department of Environmental Quality, the Florida Department of Environmental Protection, the Florida Fish and Wildlife Conservation Commission, the Texas Parks and Wildlife Department, the Texas General Land Office, the Texas Commission on Environmental Quality.

NARRATIVE

Proposed Research Project - The MS student's research will build upon my lab's research excellence in coastal plant restoration ecology, particularly factors that determine patterns of wetland plant species zonation and productivity, the resultant plant community and marsh sustainability. As clearly stated in the Master Plan (Coastal Protection and Restoration Authority), large-scale Sediment Diversions are planned to be implemented as a major restoration tool to help rebuild Louisiana's coastal wetlands. Although it seems logical to "re-connect" the river with the coast, many uncertainties remain regarding the effect of elevated nutrient loads that will be conveyed with the fresh water and sediment into the receiving basins. The current modeling efforts of the potential effects of sediment diversions on shifts in wetland plant community composition and productivity are largely restricted to data derived from studies on hydrologic regime and salinity, which are clearly important in determining species tolerance, but which also need to be considered interactively with nutrient loading. Therefore, the proposed research is of tremendous value because it will yield findings that can be immediately and directly applied to improving our scientific understanding of how sediment diversions may influence plant community composition and productivity, and the resultant data can be utilized to further refine predictive modeling of sediment diversions on coastal ecosystems. Together, these data will greatly assist Louisiana's ongoing and future coastal wetland restoration and management efforts.

The following questions regarding the effects of nutrient and sediment addition on the growth response and community dynamics of oligohaline and intermediate marshes will be specifically addressed:

- How do nutrient and sediment addition, both singly and interactively with hydrology and salinity, directly impact the short-term and integrated growth responses of key oligohaline (e.g., *Sagittaria latifolia*, *Zizaniopsis miliacea*) and intermediate (e.g., *Sagittaria lancifolia*, *Spartina patens*) plant species?
- How are soil physico-chemical properties altered by nutrient and sediment addition under different hydrologies and salinities and how do these alterations influence the growth responses of key oligohaline and intermediate plant species?
- How are competitive interactions between key oligohaline and intermediate plant species modulated by the introduction of the above treatments?

These questions will be addressed by coupling the MS student research with anticipated funding that will cover experimental and analytical costs of a mesocosm study addressing the effects of nutrient and sediment treatments relevant to a sediment diversion on the growth responses of key oligohaline and intermediate plant species. Plant species selected for this study will be those identified by the Water Institute of the Gulf's Sediment Diversion Expert Panel as having key data gaps in regard to their responses to nutrient and sediment addition beyond the effects of salinity and hydrology. Variables measured for this study will include both ecophysiological (e.g., nutrient-use efficiency) and whole plant growth (e.g., biomass partitioning) metrics, as well as soil physico-chemical (e.g., microelevation change) characterization to provide a thorough scientific understanding of the mechanisms driving plant growth response.

Relevance to OCP, Coast 2050, and CPRA Master Plan – The proposed research will be of interest and value to the Coastal Protection and Restoration Authority by providing greater (and more complete) understanding of Sediment Diversions that can be utilized to promote a sustainable coast with high levels of productivity and resilience, and providing suitable habitats for an array of commercial and recreational activities.

MS Student – I have had potential MS student applicants contact me regarding graduate work under my direction beginning in summer/fall 2015. They are interested in improving the scientific understanding of sediment diversions as a large-scale restoration tool, specifically the interactive effects of nutrient addition with hydrology and salinity. They have also expressed enthusiasm for serving as a potential CSAP intern.

Current and Anticipated Funding - I will be submitting a research proposal to the CPRA/TWIG Applied Research and Coastal Innovation Program this January (2015) specifically focused on the research questions proposed in this CSAP application. The proposed research will consist of controlled experiments in which the growth responses of key oligohaline and intermediate plant species to levels of nutrient and sediment addition anticipated from a large-scale diversion of river water are examined, both independently and interactively with hydrology and salinity. For optimal predictive and modeling value, plant species growth responses will be examined both in monospecific treatments and in pair-wise species combinations. Alterations to soil physico-chemical characteristics will also be determined to provide a greater mechanistic understanding of drivers of plant response to these treatments. In the event that funding for the CPRA/TWIG Applied Research and Coastal Innovation Program proposal is not approved, I have existing discretionary funds available within my lab's budget to offset supply and analytical costs incurred by conducting this research. I currently serve as a NOAA scientific expert on the Deepwater Horizon NRDA and am a co-Principal Investigator on an oil spill research project funded by the LSU Office of Research and Economic Development through their Gulf Research Initiative Program. However, no conflict of interest exists as the research I propose herein is completely unrelated to oil spill research and activities I have undertaken or the habitats affected by the Deepwater Horizon oil spill.

Degree Requirements and Anticipated Curriculum - University of Louisiana, Lafayette requires MS Biology students take a minimum of 9 credits per semester to maintain full-time student status, of which half must be upper division courses, and need to total 24 credit hours to graduate. The student must conduct individual research projects and submit a thesis. The curriculum/program of study that would include the following courses: Ecology and Taxonomy of Wetland Plants (BIOL 461 G), Analytical Techniques (BIOL 595), Seminar on Global Climate Change on Coastal Ecosystems (BIOL 551), Limnology and Oceanography (BIOL 441 G), Conservation Biology and Biodiversity (BIOL 412 G), Marine Dispersal (BIOL 605), Plant Physiology (BIOL 408 G), Plant Systematics and Biodiversity (BIOL 433 G), Statistical Ecology (BIOL 575), Community Ecology (BIOL 508), Marine Ecology (BIOL 580) and Coastal Restoration Ecology (BIOL 605), and at least 6 hours of independent thesis research credits.